Volume 94 Number 12

# STEEL

Production • Processing • Distribution • Use

## The Week in Perspective

SCATHING INDICTMENT of the Wagner labor bill is issued by steel leaders, charging that it seeks to regiment class against class, and to regulate their intercourse in terms of warfare rather than as associates in a joint enterprise. . . . Automobile plant workers, largely loyal to employers, see their jobs in peril if their industry is to be controlled by an organized minority. pp. 10, 13, 17

STEEL PRODUCTION last week held around 50 per cent of capacity, despite certain predictions of a recession. p. 14

SCRAP LOSSES in the steel industry amount to $250,000,000 a year when plants are operating at capacity. p. 12

CURRENT LABOR DIFFICULTIES are seen as unsettling retail demand for automobiles, though possibly this may be only a temporary situation. p. 18

OVERHEAD COSTS may be found a serious stumbling block to manufacturers if they are compelled again to slash hours in the work-work. p. 74

IF THE AUTHOR of the (Wagner) bill had intended to be fair . . . there would be found in it provisions for governmental supervision of the election of labor union officials, for the accounting by them for the many millions of dollars of dues paid by workmen." p. 13

DIESEL-ELECTRIC LOCOMOTIVES, for use on narrow-gage track, have been built for the naval ammunition depot at Oahu, Hawaii. p. 40

DOMESTIC HEATING UNIT, recently designed, may be used as an air conditioner in warm weather. In winter, it is an efficient (90 per cent) heater, burning sticks of coal. A new market for steel sheets. p. 34

AGE HARDENING of steel? It may be commercially feasible and desirable in years to come p. 53

BEEHIVE COKE OVENS operating in the Connellsville region now total 1589, last week 109 more being lighted, the total equaling the number in operation three years ago. p. 57

ARMOR OF THE NEW DEAL is developing spots of corrosion, according to Washington observers who note an increasing vulnerability in the administration's program. Powerful opposition is placing the "college professors" on the defensive. p. 15

MARBLE SURFACED STEEL, made by a laminated surface of resin woven inseparably with the metal, has been developed. p. 47

BLENDED LIQUORS are kept right for discriminating tastes in a recent installation of 18-8 stainless steel tanks and utensils. p. 32

CLEANING HOUSES in wire mills of today have been completely renovized from the hot, fume-laden and acid-dripping dens of a decade ago. p. 48

CAST ALLOY CRANKSHAFTS, now used by Ford, fulfill new demands in respect to fatigue strength. The shafts are cast vertically, four at a time, in molds made up of 16 stacked flat core sections. Metal is duplex melted, 50 per cent steel scrap, 50 per cent return crankshaft scrap. p. 25

CORRUGATED ROOF over a calcining plant meets demands for corrosion resistance, being arc welded copper-bearing iron sheets, secure against wind and water. p. 38

LACING JOINTS in a concrete highway is the purpose of a recently introduced steel plate and rod member. p. 40

STEEL JOINS HANDS with wood, instead of supplanting it, in a new type of sheet material, the metal being strongly bonded to wood backing. Strength with less weight. p. 42

# Steel To Resist Unionization; Wage Rise Hinges on Prices

*NEW YORK*

WASHINGTON learned the yield point of the steel industry last week when it climaxed its demand for shorter hours and higher wages with serious consideration of the Wagner bill, which outlaws company unions and virtually turns all industry over to the American Federation of Labor for organization.

Not in its history has the American Iron and Steel institute uttered so vehement a document as its blast, adopted by representatives of 75 per cent of the industry, against the Wagner bill.

Not only did the institute denounce the bill as vicious and politically partisan (for full text see p. 13), but it also reiterated that the industry has fully co-operated with NRA, has reabsorbed all but 20,000, or 5 per cent, of its 1929 peak employment, and has increased wages 22 per cent.

### Debate Wage-Hour Problem

This week a stand on the NRA proposal for a reduction in the work-week and a compensatory advance in wages will be taken by the institute. The decision will be much more complicated than that of the automotive industry, which is reducing its work-week from 40 hours to 36 and increasing wages 10 per cent no later than March 31.

For one thing, steel has been operating at a loss, the indicated deficit for the industry in 1933 being $74,200,000, while most automobile manufacturers have been in the profit area.

For another reason, the automobile industry deals with the consuming public and can recoup the additional cost, whereas steel encounters tremendous resistance, especially from automotive buyers, in attempting to achieve a remunerative basis. The fact that the steel work-week has averaged only 29.2 hours since the steel code became effective Aug. 17 is another consideration.

It needs also to be considered that while automobile manufacturers concede a 36-hour week, this is to be an average for the year. Peaks of 48 hours are permitted, which the year-end shutdowns for model changes will average down.

A canvass of opinion in the industry Friday indicated a desire to adjust wages upward as a palliative and a gesture toward further co-operation, provided Washington will sanction prices sustaining an advance.

Last week the automobile industry greatly strengthened the hand of steel when in effect it challenged the authority of the national labor board, and the labor board, as when the Weirton Steel Co. resisted its encroachments, conceded its limitations and virtually withdrew.

It was expected that, as a result of NRA Administrator Johnson stepping into the picture when the labor board's jurisdiction was denied, a compromise resulting in some form of employes' representation elections at automobile plants would result. This would quell the threat of a strike April 1.

No strike threats have yet been presented to steel producers other than in isolated cases, usually affecting fabricating plants. There is no doubt, however, that the administration's backing of the Wagner bill will encourage demands upon steel producers. In fact, the opposition of steel and other industries thus far has served mainly to provoke more insistent demands from organized labor that the bill be passed.

Called to the bar of the labor board for the purpose of avoiding the strike threatened by the automobile workers union of the American Federation of Labor at plants of Buick, Fisher Body, and Hudson, W. S. Knudsen, vice president of General Motors, declared that General Motors would contest unionization and declared that if it had transgressed it had been on the automobile code and not the jurisdiction of the labor board.

Meanwhile, the department of justice intimated that it would shortly seek an injunction to restrain officers of the Weirton Steel Co. from interfering with a proposed election by employes of the company, this election to supersede the Dec. 15 one which the company declares valid and the labor board disputes.

On Capitol Hill, representatives of industry were beginning last week to pour in their protests against the Wagner bill, which has the endorsement of Secretary of Labor Perkins and other high administration officials.

Although Senator Wagner, chairman of the labor board, has been advocating such legislation for several years, there is an undercurrent in Washington that the measure will not pass at this session and that its chief effect will be to enable NRA to drive a harder bargain with industry.

### A Few Industries Accede

But the Wagner bill hearings, the automobile hearing before the labor board, and department of justice activity on the Weirton case were only three rings of the Washington circus. A fourth was the continued conference of two committees of businessmen—one representing the consumers' goods industries and the other the capital goods industries—with NRA on the matter of shorter hours and increased wages. Integrated steel producers were represented on the latter committee by Charles R. Hook, president, American Rolling Mill Co., Middletown, O.

Most important, of course, of the industries to accede to the NRA program on hours and wages, which was launched at the general meetings of code authorities in Washington, March 5-7, is automobiles. Others to go along are refractories manufacturers and the packaging machinery industry.

The cocoa and chocolate industry has promised to give "serious consideration" to the proposal for a shorter week, with favorable action looked for from the canning and packing machinery industry. Important distillers also have shortened their week from 40 to 36 hours.

Whether the President will issue a blanket order that all industries operating more than 36 hours a week reduce these hours 10 per cent without curtailing current weekly earning totals was in doubt over the week-end. No decision probably will be reached until the extent of voluntary co-operation of the larger basic industries is determined.

Appraised as an outstanding pronouncement of industry's stand on labor, Mr. Knudsen's statement prior

## Protest the Wagner Bill!

**IN VIEW of the serious consequences which passage of the Wagner bill in its present form would inflict upon business and industry in general, we believe it to be in the interest of every responsible executive to wire his protest against the bill to the senators of his state, promptly.**

**—The Editors**

to his withdrawal from the labor board involved these basic points:

(1) No employe will be permitted to be coerced into any union.

(2) Manufacturers will bargain with any accredited representatives of their employes, but their authority must shown. (The automobile workers' union objects to filing its membership).

(3) The labor board has no power to dictate any election of employes' representatives. (A similar stand was taken by the Weirton Steel Co.)

(4) Manufacturers will meet with representatives of the automobile workers' union if they can show their authority, but no contract will be made with it and no recognition granted.

(5) No attempt has been made by this union to negotiate wages, and since its has not shown any authority to speak for employes it has no standing before the labor board.

(6) Any discrimination against employes is a violation of the automobile code and hence a matter for NRA and not the labor board to adjust.

There is some comment that the automobile workers' union is a vertical or federal type of organization, to which some high officials of the American Federation of Labor are opposed. The latter favor the old type of craft union.

## New Capacity

FORD MOTOR CO., Detroit, which recently contracted for a strip and blooming mill with the United Engineering & Foundry Co., Pittsburgh, is understood to be planning to pour a 16,000-pound ingot, 53 x 16 x 66 inches, and to roll it down to two slabs. Bidders on the mill have made the counter proposition of rolling this size ingot into three slabs.

While the contract for the Ford strip and blooming mill is understood to have been definitely placed, it is reported that other necessary auxiliary equipment has not yet been ordered. Among other things, Ford engineers contemplate rolling deep drawing sheet or strip stock without cross rolling or normalizing.

## Conventions

ELEVENTH national oil burner show and convention of the American Oil Burner association in Philadelphia, March 5-9, drew a record attendance of about 25,000, with air conditioning as well as oil heating equipment shown. Design and merchandising were stressed more than engineering problems. R. M. Sherman, president, Silent Glow Oil Burner Corp., Hartford, Conn., assumed the presidency.

## NRA

CODE for scrap iron, nonferrous metals and cast materials trade was signed by the President, March 13, effective March 26, becoming the 331st approved code.

The code for the scrap iron trade is part of the master code and provides minimum wages of 32½ cents per hour in the North and 27½ cents per hour in the South for male labor, 27½ cents per hour in the North and 22½ cents in the South for female labor. The work-week is 40 hours.

The code authority for the scrap iron trade elected at the last annual convention of the Institute of Scrap Iron and Steel meets this week in Washington to organize and draw regulations for administering the code.

¶New code authority appointments: Cast iron soil pipe industry; Capt. J. D. McIntyre; chilled car wheel industry, Horace B. Horton, treasurer, Chicago Bridge & Iron Works, Chicago; cast iron boiler and radiator industry and steel casting industry, D. V. Stratton, president, Johnson Motor Co., Waukegan, Ill.; gray iron foundry and metallic wall structure industries, W. C. Connelly, Cleveland, former president of the American Boiler Manufacturers' association; foundry supply and steel wool industries, George M. Forrest, consulting engineer, New York; hand chain hoist manufacturing, chain manufacturing and electric industrial truck manufacturing industries, Col. Charles R. Sanderson.

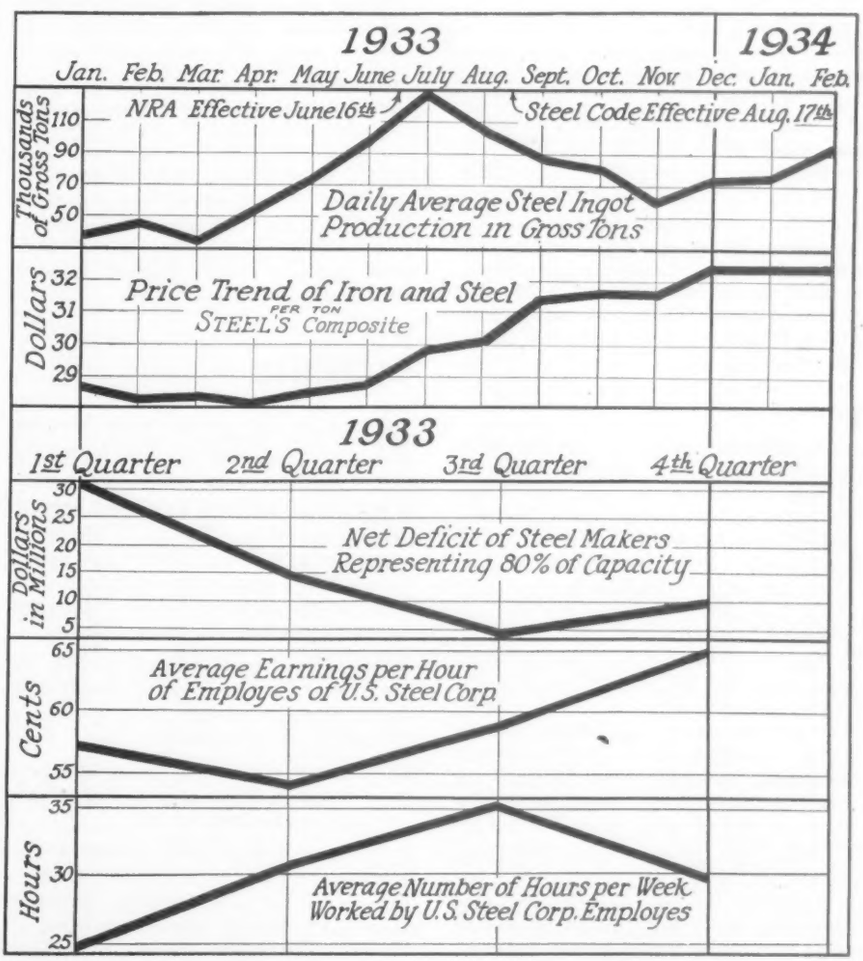
¶Code hearings scheduled: Safety razor and blade manufacturing industry, March 26.

¶The President has issued an executive order requiring bidders on government supplies to certify their code compliance.

## PWA

A BREAKDOWN of the $3,300,000,000 public works appropriation of congress in June, 1933, made by the American Institute of Steel Construction, New York, shows construction work provided for totals approximately $2,300,000,000, the remaining $1,000,000,000 being allocated to shipbuilding, civilian conservation corps works, NRA administration, etc.

## How the Steel Industry Has Responded to NRA



servation corps, loans to railroads, airplanes for the army and navy, and other public works not construction.

The $2,300,000,000 for construction has been divided approximately $1,600,000,000 for federal construction and $630,000,000 for nonfederal projects. The federal total, however, includes civil works funds, not entirely construction.

The nonfederal projects include $163,530,245 for bridges and structures, $133,964,260 for sewers, $66,666,972 for waterworks, $62,548,539 for schools, $48,771,958 for housing, $40,468,935 for streets and highways, $27,415,794 for hospitals, and $27,258,900 for power.

In view of this exhaustion of PWA funds, a policy has been adopted of considering only allotments for projects of public bodies and railroads subject to the ICC.

# Washington

FEDERAL trade commissioners met daily last week to consider the report requested by the senate on the operation of the price provisions of the steel code, the report being expected to be unfavorable to the present basing point system. However, an agreement was not reached and further consideration of the report is scheduled for this week.

¶PWA will go down to posterity by its imprint on rails financed with its funds, if nothing else. The Pennsylvania railroad, whose 100,000 tons the mills began to roll last week, has requested that the letters PWA be rolled into the rail along with the works at which the rail was produced, the date of rolling, and the heat number—the latter symbols being conventional.

Rail makers countered with the proposal to roll PWA at the end of the rail, but the Pennsylvania insisted upon the symbol being near the center where the conventional symbols are found.

¶Thundering against the international trade in munitions, Senator Borah last week attacked by name the Krupp interests of Germany, Armstrongs of Great Britain, and Bethlehem of the United States, charging them with making as high as 30 per cent profits during the depression.

The truth about Bethlehem: Deficits (not profit) of $2,356,594 in 1930, $13,179,255 in 1931, $21,049,431 in 1932, and $8,735,723 in 1933. Bethlehem in 1926 scrapped its special machinery for making big guns. Only in government navy yards is there now equipment for rifling big guns and machining breech locks.

Japanese imports of arms and ammunition from the United States in 1933 totaled $6940, of which $4100 consisted of shotgun shells, presumably for duck hunters. In January, 1934, Japan's imports of ammunition, airplane engines, parts, etc., from the United States totaled $9150.

## Steel Pays Quarter Billion Annually To Insure Quality

*IF THE scrap losses of steel plants in the United States were represented by automobiles costing $500 each, 500,000 of them could be purchased each year.*

*Driven in a single line, 10 feet apart, the sound from the horn of the last car, if it could be heard so far, would require 2¾ hours to reach the ears of the driver in the first car.*

*In a single line parade starting west from New York, the first automobile would reach Denver before the last machine would be in motion.*

*So declared E. M. Richards, chief industrial engineer of the Republic Steel Corp., Youngstown, O., in dramatizing the magnitude of the price paid by the steel industry to insure a quality product, in addressing the Mahoning Valley Foremen's association recently.*

*These scrap losses amount to $250,000,000 a year when the industry is operating at capacity, Mr. Richards estimates. This sum is the cost of making certain that axles and other vital parts of automobiles will carry their passengers in safety, that steel rails will not fail under the repeated beating of train loads, that steel members can be depended upon to support the structure of skyscrapers and sustain the loads of bridges in safety.*

# Institute

AMERICAN IRON AND STEEL institute reports the following prices filed:

¶Bessemer pig iron $18, f.o.b. Birmingham, effective March 22. The wide spread over foundry iron in the South is said to be due largely to the difference in the price on ores, bessemer having to be largely imported.

¶Hot rolled annealed wasters No. 18 gage are 1.35c, Pittsburgh, and 1.45c, Gary, effective March 19. This is a reduction of $2 a ton.

¶Bessemer or basic manufacturers wire is 2.68c, Houston and Galveston, Tex., effective March 19.

¶Chrome silicon steel made in the electric furnace is reduced 13 cents to 5.14c at Pittsburgh, effective March 19, and to the same level at Chicago, effective March 23. This steel made in the open hearth is 4.89c, Bethlehem, Pa., effective March 23.

¶Street car and interurban wheels, 26 inches in diameter, are reduced 75 cents to $19.25, Pittsburgh, per wheel untreated, effective March 26.

¶Effective March 15, base prices at Pittsburgh on stainless steel ingots with 0.12 carbon, 13 per cent chrome, 1 per cent each copper and silicon, and on rerolling billets with 0.12 per cent carbon, 8 per cent chrome, 18 per cent nickel and 1.25 per cent silicon were withdrawn.

¶University of Pittsburgh will shortly begin an extensive survey of the steel industry in conjunction with the Brookings institution, Washington, and the co-operation of the American Iron and Steel institute. Recently, the university was granted a fund for the study of the functioning of a typical American industry both before and after the national industrial recovery act, and the steel industry was chosen for the study.

# Labor

FOR two weeks a commission appointed by Governor Pinchot of Pennsylvania has been visiting Ambridge, Pa., hearing first-hand reports of last fall's rioting at Spang-Chalfant & Co.'s and neighboring plants there.

Last week the commission went back to Harrisburg, Pa., having been informed of the following highlights: Beaver county deputies had raided strikers' headquarters before the riots and seized communistic literature. Beaver county's sheriff, C. J. O'Laughlin, reiterated his denial that he gave the order to fire on disturbers when one man was killed and others wounded. Sheriff O'Laughlin also denied that Jones & Laughlin Steel Corp. had furnished arms and funds for the 240 deputy sheriffs who routed picket lines. Said Sheriff O'Laughlin: "Beaver county paid these 240 deputies $6 a day and spent $5806 for ammunition."

Governor Pinchot's commission has not yet made public its report.

¶Aluminum Co. of America, Pittsburgh, has granted an 11 per cent increase in wages to employes retroactive to March 1, but not effective where hourly rates have been increased more than 11 per cent since Aug. 1. Employes at three Aluminum company plants in the New Kensington, Pa., district returned March 11 after a 10-day "holiday."

¶Fifty-four plants at Pittsburgh completed the last six months of 1933 without an accident, according to statistics just gathered in the sixth interplant safety contest sponsored by the Western Pennsylvania Safety council.

Among the 21 group winners were Plant No. 1, Union Drawn Steel Co.; Templeton Works, Harbison-Walker

Refractories Co.; Shop No. 2, American Can Co.; Russell, Burdsall & Ward Bolt & Nut Co.; Leetsdale plant, McClintic-Marshall Corp.; Monessen works, Pittsburgh Steel Co.; and Aliquippa works, Jones & Laughlin Steel Corp.

¶Youngstown Sheet & Tube Co. is distributing copies of its employe representation plan—a form of collective bargaining which for 15 years has functioned to the satisfaction of both employes and management.

Under the Youngstown plan, one representative for every 300 employes, excluding officers, salaried employes and foremen, is elected by secret ballot for one year. At present, the number of representatives in the Youngstown district is 49, and in the Chicago district 22.

# Transportation

UNLESS spring comes unusually early to the Great Lakes region, it probably will be May before the iron ore transportation season opens. Ice in upper lake harbors and Great Lakes channels last week was as thick as 48 inches, and abnormal conditions, the result of the unusually cold winter, are reported in all harbors.

Last year a cargo of scrap iron arrived in Cleveland from Detroit on Jan. 29. The first iron ore cargo cleared from Duluth on April 22, and the first iron ore of the season was unloaded at Buffalo on April 30.

But a late opening will not be a handicap. Stocks on Lake Erie docks March 1 totaled 5,175,886 tons, sufficient for at least three months production of pig iron at the rate of consumption in February. Last year the lake movement of iron ore was about 21,000,000 tons; the all-time low was 3,500,000 tons in 1932; estimates for 1934 range from 30,000,000 tons upward.

¶Carnegie Steel Co.'s steamer I. LAMONT HUGHES returned to Pittsburgh last week from New Orleans after delivering the one hundredth tow of steel products for Carnegie Steel Co. (photograph, STEEL, Feb. 5, pp. 13). Luckily, the I. LAMONT HUGHES just escaped being frozen in the rivers as many an Ohio river steamer was in February. With her tow of 8000 tons of steel she left Pittsburgh Jan. 25 and raced a freezing river the better

# Iron and Steel Industry Balks at Wagner Labor Board Bill

## Institute Scents Danger in Sweeping Powers—Urges Halter on Union Labor

THE Wagner bill is designed to control all labor matters by political rather than economic forces and to destroy the friendly relationships now existing between employers and employes and thus disrupt the industrial welfare of the nation.

The chief object of the bill is to turn the control of American industry over to a national labor union monopoly, nothwithstanding the fact that national labor unions by appeals for voluntary membership over a period of many years have succeeded in enrolling less than 10 per cent of the workers of this country in their ranks.

Employes of iron and steel companies have made remarkable progress with their plans of employe representation, which have been in effect among employes of some of the companies for more than 15 years. It is now proposed to undue all such progress and by legislation to force the workers of the country into national labor unions. During this same period, the workers of the country have seen the national labor unions pursue many economic fallacies including the throwing out of work of large numbers of men because of useless jurisdictional controversies.

### Super-Power for Board

The bill seeks to create a permanent national labor board with more power than any governmental agency has ever had or than any court in the land possesses today. Even during the World war, the war labor board had no such sweeping power as that sought to be given by the Wagner bill.

Under the provisions of the bill it is an offense, subject to fine or imprisonment, for an employer to participate in any way in any organization of his employes or even to compensate them for working time lost while engaged in furthering the interests of their fellow employes or settling their difficulties with the management.

Any friendly contact between an employer and his employes in which the employer expresses his preferences for one form of organization or another might also be considered an offense by the labor board and subject the employer to the penalties of the act.

Although the employer is vitally affected by any agreement with his employes, he would not be permitted to express any opinion as to whether the organization with which he is required to deal is truly representative. On the other hand there is nothing in the labor bill that restrains the unions from any manner of influence or coercion.

### No Shackles on Unions

Although the employer is denied by law the right to have injunction in the federal courts to protect his property, no such restriction is placed upon the labor unions. The board may hold its hearings in Washington and summon witnesses and records from any part of the United States, without regard to the consequent inconvenience and expense, and its findings of facts are conclusive.

It may assess damages against an employer in unlimited amounts, but it is astounding to find that the bill does not provide for the assessment of any penalties or damages against labor unions.

We do not know of any law which puts such arbitrary and complete power in the hands of any board or court, and we believe that industry could not function under such a law.

The iron and steel industry has given support to the national recovery administration and has co-operated in every way under the steel code; all but 20,000 people who were attached to the industry at the 1929 peak have been reabsorbed into the industry, which now has on its payrolls approximately 400,000 people. Wages have been advanced more than 22 per cent. The industry has cooperated through its code in the belief that government regulation under the recovery act was a temporary measure for the emergency, realizing full well that legislation, subject as it is to changing political influence, cannot permanently take the place of economic laws.

The Wagner bill, however, is not limited to the emergency, but would create a permanent labor tribunal with powers so extensive as to make further efforts and sacrifices on the part of industry in this emergency seem futile.

If the author of the bill had intended to be fair to both employers and employes, there would be found in its provisions for governmental supervision of the election of labor union officials, for the accounting by them for the many millions of dollars of dues paid by workmen which would come to them through this legislation.

There would likewise be provisions imposing an obligation upon labor unions to become incorporated and legally liable for their acts, and giving the employers the same remedies against them as are provided in favor of labor unions and against employers.

### Sets Chip on Shoulder

Disguised under the title "A bill to equalize the bargaining power of employe and employer, to encourage the amicable settlement of disputes between employers and employes . . ." its provisions nevertheless hark back to the old and thoroughly disproved philosophy that the interests of employes and employers are more antagonistic than mutual.

Assuming that they have nothing in common, it seeks to regiment class against class, and to regulate their intercourse exclusively in terms of warfare rather than as associates in a joint enterprise.

part of the way from Pittsburgh to New Orleans.

¶Large holders of and dealers in railroad securities have organized a commitee to consider ways of improving railroad earnings, one suggestion being a campaign for higher freight rates. Pierre S. duPont, a director of the Pennsylvania railroad, is chairman of the committee, on which are represented all leading railroads, the railroad equipment industry, and life insurance presidents.

# Production

STEEL production fluctuated within narrow limits last week, holding at approximately 50 per cent. Forecasts of a sharp reduction last week made by other agencies were based upon the expectation of some capacity being taken off, but this was deferred at least until current week.

Operating rates were steady in all districts except for a 1 point rise at Pittsburgh and in eastern Pennsylvania, a 3 point decline in New England and a 1½ point decrease at Chicago. This week New England will rebound, while Youngstown may be off 3 points, and Pittsburgh 2. The operating situation fluctuates from day to day because of the disturbed labor situation.

**Pittsburgh:** Up 1 point to 35 per cent last week, with the rate expected to decline to 33 per cent this week, due to completion of a rail schedule by Carnegie Steel Co. at the Edgar Thomson works. There are still 19 out of 60 steelworks blast furnaces on with individual rates unchanged. Carnegie Steel Co. continues to blow 9 out of 32 blast furnaces; Jones & Laughlin, 3 out of 11; Bethlehem at Johnstown, 3 out of 7; National Tube, 1 out of 4; and American Steel & Wire Co., Pittsburgh Crucible Steel Co. and Pittsburgh Steel Co., each 1 out of 2.

**New England:** Down 3 points to 63 per cent last week, with indications that all ground lost will be regained this week.

**Cleveland-Lorain:** Continued at 82 per cent, with no change scheduled for this week. Corrigan, McKinney Steel Co. operates 13 open hearths; Otis Steel Co., eight; and National Tube Co., Lorain, 11.

**Buffalo:** Unchanged at 52 per cent, with 20 open hearths continuing active. No immediate major change in production is indicated for this district.

**Chicago:** Declined 1½ points to 48½ per cent, due principally to reduced production of lighter products. Heavier orders for rails point to a maintenance of steelmaking around current levels for the near future. Blast furnace schedules are unchanged with 11 of 36 steelworks stacks active.

**Wheeling:** At 70 per cent of capacity, steelmaking operations in this district were unchanged last week, the rate involving 27 out of 39 open hearths in four district plants. The rate of 70 per cent of ingot operations will continue this week.

**Central eastern seaboard:** Up 1½ points to 32-33 per cent last week.

**Detroit:** Holding at 93 per cent, one producer having all eight open hearths on and the other operating 7 out of 10.

**Youngstown:** Unchanged at 56 per cent last week, with rate expected to decline to 53 per cent at beginning of this week. Forty out of 83 open hearths are melting.

¶A gain of 53,723 tons in shipments of finished steel products by United States Steel Corp. subsidiaries in February lifted the month's total to 385,500 tons. In February, 1933, when the banking situation began to get bad, only 275,929 tons were shipped. In two months of 1934 shipments totaled 717,277 tons, compared with 561,067 tons a year ago.

**STEEL CORPORATION SHIPMENTS**

(Tons)

| | 1934 | 1933 | 1932 | 1931 |
|---|---|---|---|---|
| Jan. | 331,777 | 285,138 | 426,271 | 800,031 |
| Feb. | 385,500 | 275,929 | 413,001 | 762,522 |
| March | ..... | 256,793 | 388,579 | 907,251 |
| April | ..... | 335,321 | 395,091 | 878,558 |
| May | ..... | 455,302 | 338,202 | 764,178 |
| June | ..... | 603,937 | 324,746 | 653,104 |
| July | ..... | 701,322 | 272,448 | 593,900 |
| Aug. | ..... | 668,155 | 291,688 | 573,372 |
| Sept. | ..... | 575,161 | 316,019 | 486,928 |
| Oct. | ..... | 572,897 | 310,007 | 476,032 |
| Nov. | ..... | 430,358 | 275,594 | 435,697 |
| Dec. | ..... | 600,639 | 227,576 | 351,211 |
| Less yrl. adj. | ..... | ..... | 5,160 | 6,040 |
| Tot. | ..... | 5,760,952 | 3,974,062 | 7,676,744 |

# They Say:

WHEREAS the NRA has increased costs, the additional working margin on sales is beginning to manifest itself sufficiently to cover these extra costs. The improvement in marketing conditions and broadening of commercial activity will more than compensate for the increased costs" — Julius S. Kahn, president, Truscon Steel Co., Youngstown, O.

¶"Improved methods and labor saving tools are multiplying production much faster than the population increases . . . . The effective remedy will not be found in individual limitation of output per unit of time, but in limitation of the time each worker is employed . . . . It is the duty of management to work its capital and machinery as many hours as possible to the end that employes may not be required to work long hours."— Jerome N. George, vice president, Morgan Construction Co., Worcester, Mass. (A prophetic statement made in October, 1928, antedating NRA five years.)

# Uses of Steel

GENERAL HOUSES INC., 220 South State street, Chicago, pioneer in the development of pre-fabricated steel houses, has let the contract for four houses and appointed three additional dealers. Howard T. Fisher, president and chief architect, reports scores of active inquirers, forecasts a shortage of adequate single family dwellings and is optimistic concerning the spring market.

¶Eight tons of steel, including the shaft, rolls, gearing, wires, and other working parts are in a new loom manufactured by the Crompton & Knowles Loom Works, Worcester, Mass., claimed to be the largest of its kind for weaving felt. The weaving length between swords is 550 inches. In addition to steel, there are 12 tons of cast iron in it.

# Financial

PAMPHLET report of the United States Steel Corp. for 1933 shows production of subsidiaries as follows: Ores (iron, manganese and zinc) 8,345,767 tons; limestone, dolomite, fluorspar and cement rock, 5,410,752 tons; coal, 10,227,230 tons; coke, 4,879,785 tons; pig iron, ferro and spiegel, 5,026,209 tons; steel ingots and castings, 8,046,995 tons; rolled and finished steel products for sale, 5,536,322 tons; portland cement, 6,957,100 barrels.

Domestic shipments of Corporation subsidiaries in 1933 included, rolled and finished steel products, 5,405,801 tons; pig iron, ingots, ferro and scrap, 174,570 tons; coal, coke, iron ore and limestone, 1,830,994 tons; sundry materials and by-products, 152,726 tons; portland cement, 6,726,598 barrels. Export shipments were, rolled and finished steel products, 399,434 tons; pig iron, ferro and scrap, 512 tons; sundry materials and by-products, 25,447 tons; portland cement, 89,356 barrels.

Total volume of business of Corporation subsidiaries in 1933 was $524,968,768, against $357,201,705 in 1932. Expenditures for ordinary repairs and maintenance, exclusive of blast furnace and coke oven relinings totaled $38,415,539, tax payments reached a new high of $32,558,544, average number of employes working during the year was 172,577, payrolls totaled $163,149,503, average number of hours worked per employe per week was 30.4, and average earnings per employe per hour were 59 cents.

As noted in an earlier issue, total deficit of the Corporation from operations in 1933 was $30,368,296, this

(*Please turn to Page* 74)

# WINDOWS OF WASHINGTON

*WASHINGTON*

## New Deal Is on Defensive

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## Showdown on Labor Is Near

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## PWA Cuts More Red Tape

TODAY the new deal is nearer to a showdown than at any time in the 54 weeks of its existence. At the moment, the labor crisis is the focal point of interest, but it is only a symptom of subtle but significant changes in public sentiment which have developed in the past few weeks.

The first intimation that the new deal was vulnerable to effective attack came about through the cancellation of the air mail contracts. Future historians probably will point to this as the event which marked the end of the Roosevelt honeymoon and the beginning of the period of critical, cold-blooded analysis of the administration's policies.

The Lindbergh incident, the poor showing of the army air force on the mail routes and other events quickly established the air mail incident as a grave mistake on the part of the administration.

Meantime the federal trade commission released a few figures on high salaries of industrial executives. Shortly thereafter the obnoxious features of the securities control bill caused deep concern in business circles.

Next, General Johnson's conference of code authorities ran into unexpected difficulties. Apparently the administration had anticipated only perfunctory opposition and had planned that at the conclusion of the conference the President would be able to put through a 10 per cent increase in wages and 10 per cent reduction in hours without serious challenge from industry.

However, strong opposition developed. Industrial spokesmen gave good reasons why it was impossible to place blanket restrictions on all industries. Therefore on Wednesday night at the concluding session, General Johnson—instead of issuing a definite pronouncement as to what industry would do—softened his remarks to convey the idea that the presidential request would apply only to such industries as were in a position to comply. Even the executive order from the President, which had been hinted during the conference, was reconsidered and withdrawn.

These two setbacks, in conjunction with the rising tide of opposition in congress, indicate that for the first time since March 4, 1933, the Roosevelt administration is on the defensive.

Within the past two weeks, critics have stated boldly for the first time that NRA has retarded business more than it has stimulated it. William Randolph Hearst's ringing plea on March 10 for an "about-face" in Rooseveltian policies received a greater ovation throughout the nation than is realized in the inner circles in Washington. His warning that business is being "doctored to death" reflects the attitude of a rapidly increasing number of thoughtful individuals throughout the country.

In brief, Washington, for the first time in this administration, is encountering powerful opposition to its program.

AND now the difficulties of this uncomfortable situation are compounded by the advent of a crisis in labor relations!

The current mess can be explained in several ways, depending upon one's viewpoint. Many authorities believe that it can be attributed solely to the government's failure to clearly interpret Section 7A of NIRA. These critics say that the administration deliberately refused to clear the ambiguity of the collective bargaining clause in order that union labor might have ample leeway to enlarge its membership. This policy, they contend, encouraged unionists to expect more assistance from the administration than it actually has been able to deliver. Thus, they conclude, the administration now is forced to go a step further. In order to deliver to union labor, in accordance with earlier expectations, it is obliged to throw its support to the Wagner bill.

Another line of speculative reasoning is that the administration maneuvered its labor policy so as to foment widespread dissatisfaction in the ranks of union labor at a time when "protection" against the threat of synthetic strikes could be used as a lever to force industry to adopt shorter hours and higher wages. If this unlikely explanation is true, it would indicate that the administration has astounding confidence in its ability to introduce harmony suddenly into a situation which for months has been out of control.

Still a third explanation is that the present mess is a case of "too many cooks spoil the broth"—that the participation of too many theorists in the solution of an admittedly intricate problem has created a condition of chaos.

Whatever be the true explanation, the result is a situation in which government, labor and industry probably will drive through to a showdown.

Government, with several recent defeats marked up to its discredit, faces an aroused industry which feels that it can co-operate with its workers more effectively without government assistance than with it. Moreover, the stern stand of the automobile industry cannot fail to hearten the manufacturers, steelmakers and others, who until now have fought for their interests with little moral support from their contemporaries in business.

A PRONOUNCED change in attitude is reflected by NRA, and it is indicated that this organization is losing some of the spirit of tolerance which it has exhibited up to this time. For instance, it has been a distinct policy to let industries come

voluntarily under codes. It is an open secret that codes are about to be imposed on certain large industries which, the administration feels, have delayed unwarrantably long in voluntarily setting up for self government under NRA.

Much of NRA's change in attitude is traced to the result of a Supreme court decision which seems likely to exert a vast effect upon the future of industry. Sometime ago the New York state milk board set 9 cents a quart as the retail price of milk and brought action when a grocer in that state made a present of a loaf of bread with each quart of milk. The Supreme court upheld the state, ruling that legislative bodies are primarily the judges of the necessity of any law which they pass and "that every possible presumption is in favor of its validity and that though the court may hold views inconsistent with the wisdom of the law, it may not be annulled unless palpably in excess of legislative powers." The administration view is that this decision removes all question as to the constitutionality and authority of NIRA.

This has a vital bearing on the coming report of the federal trade commission on steel prices. This report, prepared by the commission's legal department, and under review by the commissioners for a week, is said to find serious fault with steel prices and basing points. But if the milk price decision is a firm precedent, it is easy to see that the steel industry has little to fear as long as it operates under the approval of NRA.

Certain changes in the personnel of NRA are developing. General Counsel Richberg arose from a sick bed to make a timely address at the conference of code authorities on the significance of the milk price decision. He is away to recuperate and is expected to be less active when he returns. The heavy duties of his office have devolved on his assistant, Blackwell Smith. Division Administrator A. D. Whiteside has gone to Florida for a vacation and will return to New York, at least for a time, to resume his business interests. W. Averill Harriman has been promoted to the post of special assistant administrator of NRA, succeeding L. D. Tompkins, recently resigned. Mr. Harriman had been division administrator of the heavy goods division for several months.

NOW that the attorney-general has ruled that it has the necessary authority to acquire real estate and to build and operate housing projects, PWA will again proceed with its housing program.

It will be recalled that proposals to lend money for housing groups at Cleveland, Brooklyn, Indianapolis, Atlanta, Chicago and Hutchinson, Kans., were rescinded due to failure of the interested localities to raise the required junior money. The decision enables PWA to go ahead with these projects. They are being turned over to the Emergency Housing Corp., of which Col. Horatio B. Hackett, with headquarters in the Interior building, is head. Charles Pynchon has been called from Chicago to serve as his assistant.

Mark Twain's famous remark about the weather is applicable to the prospect for the extensive use of steel in houses erected under government sponsorship. There is much talk on the subject, but not much progress. A number of competent observers feel that the steel producing and fabricating industry is overlooking a real opportunity to develop a tonnage business of large proportions. It is believed here that residential construction in the next few years will run into billions of dollars, and that industries which can participate in furnishing good homes at low cost will benefit. One well-informed view is that "the housing requirements of the country supply the opportunity for the principal industry on which business again will rise to prosperity."

RAIL buying, under stimulus of PWA loans, this year will be substantially double that of either of the last two years. In 1932 rail purchases aggregated 402,566 tons and in 1933, 390,785 tons. So far this year rail sales have approximated 350,000 tons, and it is expected the year's total will be slightly above 800,000 tons. Loans already approved by PWA will finance the purchase of 443,919 tons and it is expected this total will be increased by an additional 50,000 tons. Privately financed purchases to date account for 214,992 tons, and it is expected additional purchases not coming under PWA loans will come to about 100,000 tons. Inasmuch as the present price of rails was extended to April 1, it is expected here that most of the projected 800,000 tons will have been placed by that date.

The Gordian knot of railroad credit, it is understood here, was cut by a single stroke, so that there now is no question about consummation of any of the PWA railroad loans as originally arranged. Railroad collateral deposited with RFC on previous loans, it is reported, has been approved as the basis of second mortgages to secure PWA loans. Hence all PWA-financed purchases are expected to be made promptly as planned originally.

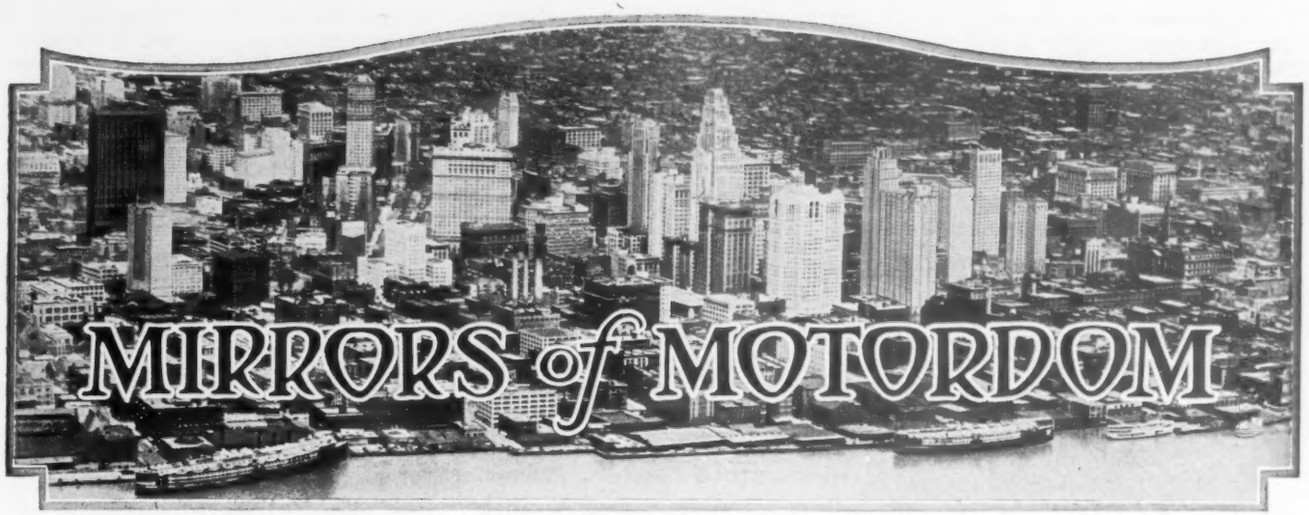
PWA signed contracts provide for $67,249,000 for financing purchases of new cars and locomotives, while allotments not yet signed provide for an additional $13,099,000 for such new equipment. Contracts signed also provide for $21,744,281 to be spent in repairing equipment while allotments not yet signed will provide an additional $6,177,486 for such repairs. These figures include only PWA loans and not the amounts, additional to PWA money, which railroads have spent or will spend for new equipment repairs.

RUSSIAN trade reflects promise, but it will develop by easy stages. Well informed authorities believe that the granting of four to five-year credit terms will be necessary if the United States is to compete against Europe for Russian business on a large scale. A shipload of American construction machinery and repair parts, including concrete mixers, ditch diggers, caterpillar-tread shovels, etc., has been unloaded at Odessa.

Formation of the Second Export-Import bank, under RFC, is not regarded as heralding an immediate expansion of trade with Cuba. The sole purpose of the bank, for the present, is to finance the purchase of $10,000,000 worth of silver by the Cuban government under a United States government loan.

A hint of the difficulties encountered in any attempt to stimulate foreign trade by means of adjustments in the tariff is furnished by the determined opposition in the senate to President Roosevelt's request for additional authority for negotiating tariffs with individual countries. American history shows that tariff policy has been more consistently charged with political dynamite than any other single, national problem.

THE President has modified all NRA codes to permit the hiring of handicapped persons, either through age or infirmity, below code minimum wages. . . . There is vague talk of a chain of power lines linking the four big government projects—Boulder dam, Muscle Shoals, Columbia and St. Lawrence river developments—which would require many miles of towers and cable. . . . When producers began quoting identical prices, authorized by codes, on government purchases, the name of the successful bidder was drawn from a hat, so it was thought that the more bids a manufacturer put in (through sales agents) the better. But it doesn't work any more. The government is considering only one bid of any manufacturer . . . . NRA is disposed to give every consideration to industries reporting shortages of skilled labor. Shortages of tool and die-makers, chromium-platers and molders are reported from certain districts and will be considered. In fact, the packaging machinery industry, in making a reduction from 40 to 30 hours per week, specifically excepted certain wage brackets including skilled workers.




## Fervor for New Deal Cooler

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## Minorities are Only Concern

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## Chrysler Bulwarks Suppliers

*DETROIT*

WHEN Franklin D. Roosevelt was campaigning for president in 1932 he arrived in Detroit the same hot Sunday that Joe Mendi, famed chimpanzee at the Belle Isle zoo, reappeared after a long illness.

Joe attracted to his cage a far greater crowd than Mr. Roosevelt did to his auditorium—a fact which the Republican newspapers of Michigan relayed with ill-concealed glee. But Mr. Roosevelt had the last laugh when he converted labor and carried this old line Republican state by a large majority.

During most of 1933, Mr. Roosevelt's popularity with labor was unquestioned. The bank holiday, which originated in Michigan, only fortified sentiment for him. And as he supplied fresh courage and the country began to rouse from its stupor, demand for automobiles revived and Detroit benefited, of course.

Labor generally has been loyal to the automobile industry. The few body and parts makers who depressed wages unduly and precipitated trouble last year were the exceptions. Chevrolet pays its sweepers more than many classes of skilled steel labor; Ford's daily minimums always are headline news; General Motors, Chrysler and other large employers have the reputation for being generous.

But last fall sentiment for Mr. Roosevelt began to wane a little. Many of the older employes resented the effrontery with which union labor organizers sought to corral them, under the suggestion that Washington commanded it. When the small but crucial tool and die making industry was called out on strike last November, the cost to labor in the wages lost was almost as great as to automobile manufacturers themselves.

Despite delays in getting new 1934 models under production, automobile labor has closely approximated 1929 earnings, and the promise of employers that it will probably earn this year as much as in that lush year has made a deep impression.

Now, the threat of a strike and the possibility that a small group in each plant could tie up production and make things unpleasant for the great bulk of loyal workers are leaving a distinct reaction against Washington and NRA.

DETROIT in the past couple months has emerged as probably the most confident and inspiring of the large industrial cities. Even with the new 36-hour work week not yet in effect, there is a shortage of labor. Merchants are collecting the bills they permitted to accumulate. Apple sellers are disappearing from the streets. Back taxes are being paid.

No man who can qualify as an experienced welder, metal stamper, machinist or parts maker is idle except from choice. Blind ads for these classes of workers have been inserted in leading newspapers all over the country by Detroit employers, and so many taxi drivers have been recalled to automobile plants that there is a shortage. Government agents have complicated matters by competing for experienced screw machine operators for navy yards.

Automobile executives have never been more than lukewarm for both the administration and NRA. Young, at times impetuous, having grown up with the industry and shared generously with labor, they are less disposed to be regimented than some of the representatives of the older and more settled industries.

It will be recalled that other industries went to Washington to submit their codes to NRA, but General Johnson flew to Detroit last July to cajole automobile executives into cooperating, and they did this only after getting his consent to inclusion of the so-called merit clause, a concession won by no other industry. Executives have lost what little enthusiasm they had for Washington after witnessing the open assistance supplied to the attempt to unionize their industry.

So the lineup is that the great bulk of labor is disposed to be conservative and to prefer working, especially at a further increase of 10 per cent, to striking for abstract recognition. Executives, of course, are determined to resist, and partsmakers and other suppliers share this feeling. Detroit—meaning thereby the general business community—also is opposed to any unionization or strike.

The expectation here is that the industry will again maintain itself against the pressure of Washington, and while it may make some concessions for the sake of peace, there will be no dealings with outside representatives of labor except where unionization is actually preferred. In any such concessions, General Motors and Chrysler especially are relying on their strong employes' representation plan.

Whatever danger there is lies in the distress which could be created by a relatively small group of malcontents in each plant and the possibility of their intimidating loyal workers.

There is evident a little glow of pride that the automotive industry is the first to put on the gloves and stand up to the administration and NRA. While the Weirton Steel Co. and the E. G. Budd Mfg. Co. resisted encroachments of the national labor boards, these stands represented more the personal courage and state of mind of their executives than the industries they belong to.

It is noteworthy, too, and encouraging to Detroit that it was W. S. Knudsen, vice president of General Motors in charge of manufacturing operations, and not some New York

financial executive of the corporation who was spokesman at Washington. To a man in the factory Mr. Knudsen personalizes General Motors, and his ascendancy in its counsels is another assurance that Detroit no longer will be a remote hinterland for New York.

ANOTHER cause for grievance in the present labor situation is that it is unsettling the retail market for automobiles.

This tendency in demand to level off may be only temporary, and may vanish if industry is smoothed down, but it is quite apparent at the moment. March production of automobiles, as a result, will probably be nearer 300,000 than 350,000 units, and may prove to be the spring peak. It needs to be emphasized, however, that this picture may change over night.

Ford, at close to 4000 units daily, is not expanding, its dealers are stocked and able to make prompt deliveries. March output will be about 80,000 units, as scheduled, but there is a little doubt whether April will push up to 105,000.

Chevrolet assemblies the middle of last week were adjusted downward slightly, and at the moment there is a shadow of doubt whether it will quite attain the 100,000 units scheduled for March. Plymouth likewise is not gaining at the rate it was a month ago.

On this matter of production, Detroit is peculiarly dependent upon the remainder of the country. If labor trouble develops and pay envelopes become thinner and fewer as a result, the expected further upturn in production during the early part of the second quarter may not materialize. Last week's straws are not conclusive.

This uncertainty, however, has not dampened the enthusiasm for new models. Packard, as noted a week ago, appears to be cleaning up its stock of parts on the current models, preparatory to a change. Hupp is not many weeks distant from the announcement of its new, smaller model. The small Buick and a new Auburn also are in the offing. Ford is making progress on the radical streamlined victoria model.

CREDIT Chrysler, which led the procession in streamlining this year, with another shrewd move in corralling extensive stamping facilities.

Sensing not only a good automobile year but also the danger from strikes, Chrysler set out to have as many stamping shops as possible feeding in Chrysler parts. Therefore, in addition to its established sources, Chrysler has proceeded to put under contract leading sheet metal workers in Philadelphia, Detroit, Cleveland, Toledo and Salem, O.

Meanwhile, the Dodge plant in Detroit a few months ago was completely re-equipped with a large number of new presses, many of which have not yet been used. Thus, Chrysler has cleverly straddled on parts supply and is protected unless all parts makers should be shut down by labor trouble simultaneously with a walkout in Detroit. Incidentally, Chrysler is not one of the manufacturers against which automotive labor has complained at Washington.

The one weak link in the Chrysler chain has been steel forgings. Its Newcastle, Ind., forge plant has had difficulty coping with requirements, being so short of steam power that recently railroad locomotives were lined up on a nearby siding to generate steam for the plant. Connecting rods for Chrysler motors are now being turned out in the Willys-Overland plant in Toledo. A week ago a one-year lease was signed by Chrysler on about one-fourth of the manufacturing space in Continental Motors Corp. plant in Detroit.

Hudson-Terraplane sales in the week ended March 10 totaled 1380, highest since July, 1931. . . . When Plymouth made retail delivery of 17,340 cars in February it broke all February records for that unit of Chrysler. . . . General Motors stockholders in the first quarter totaled 351,949, compared with 372,284 a year ago. . . . Chevrolet's assembly of 72,273 units in February was an increase of 78 per cent over January. . . . By the end of May Pontiac expects to build 78,300 cars, compared with 45,000 in the same months of 1933.

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# Died:

W C. BOGUE, 57, formerly identified with the sales department of the American Steel & Wire Co. at Chicago, and later Detroit representative for the Carnegie Steel Co., Pittsburgh, at his home in Chicago, March 14.

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Thomas Davis, 86, president Orange Machine & Mfg. Co., in Orange, N. J., March 8.

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L. M. Manion, 55, president of the Manion Steel Barrel Co., Oil City, Pa., in that city, March 7.

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Thomas W. Bryant, chairman of the board, Union Hardware Co., Torrington, Conn., in New York, March 15.

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Stephen J. Hauser, vice president of the Hauser-Standard Tank Co., Cincinnati, in St. Petersburg, Fla., March 11.

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Stanley G. Flagg, 74, president of Stanley G. Flagg & Co. Inc., Pottstown, Pa., manufacturer of malleable pipe fittings and castings, at his home in Philadelphia, March 14. He was one of the founders of the American Foundrymen's association, serving as president in 1907-8.

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Joseph D. Davy, 64, for 12 years head of the Nashville Boiler & Sheet Iron Works, Nashville, Tenn., at his home there, March 8.

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Lahman F. Bower, 75, former vice president of the Allis-Chalmers Mfg. Co., Milwaukee, in Shippensburg, Pa., recently.

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Hudson E. Bridge, 75, chairman of the board of Bridge & Beach Mfg. Co., pioneer St. Louis stovemaker, in St. Louis, March 5.

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Edwin J. G. Cameron, 62, president of the Cameron Iron & Brass Works, North White Plains, N. Y., in a Yonkers, N. Y., hospital, Feb. 26.

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Theodore Hudson, 49, supervisor of steel and concrete work for Seattle, at his home there, March 5. He was widely known in steel and engineering circles.

□ □ □

Walter D'Arcy Ryan, 63, pioneer illuminating engineer with the General Electric Co., at his home in Schenectady, N. Y., March 14. He was responsible for many modern floodlighting effects, including that of Niagara falls. He was director of lighting for the Century of Progress exposition in Chicago.

□ □ □

August F. Reichert, 83, founder and president of the former Reichert Mfg. Co., Milwaukee, now the Metal Forms Corp., in Milwaukee, March 6. He was known as an expert toolmaker and designer until his retirement in 1917. While with the Harnischfeger Corp., Milwaukee, he perfected the first metal form for monolithic concrete construction.

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## Fight Railroad Protest on Lake Erie-Ohio Canal

A delegation of Pittsburgh civic leaders joined in the fight for approval of the Mahoning-Beaver route for the proposed Lake Erie-Ohio river canal with Youngstown backers before a public hearing at Youngstown, O., March 13, held before army engineers.

In addition, representatives from Wheeling, W. Va., Bellaire, O., Sharon, Pa., New Castle, Pa., and Warren, O., joined in support. Opposition was centered in the joint brief of ten railroads attacking the waterway project as too costly.

# Industrial Men in the Day's News

## Joel Claster, New President, Institute of Scrap Iron and Steel Inc.

Legal training should aid him in guiding the scrap industry in its first year under the NRA code.

He has been active for some time in community and civic life of Reading, Pa., where he resides.

As president of the institute, he now heads the code authority group for the scrap trade.

JOEL CLASTER, new president of the Institute of Scrap Iron and Steel Inc., appears particularly well qualified for this position, to which he was elected at the institute's recent convention in Atlantic City, N. J., as noted in STEEL for Jan. 22.

Prominent for a number of years in the scrap industry and fully conversant with its problems, he also has the adequate legal training which should serve the institute especially well during its first year under NRA.

At 42 he is vice president of Luria Bros. & Co. Inc., Reading, Pa., one of the largest scrap iron organizations in the United States. He is a member of the Pennsylvania bar, having graduated from Dickinson college and law school.

Actively identified with community and civic life of his home city, Reading, he has served in official capacities with various local organizations.

As president of the institute, he heads a group of eight men who constitute the code authority for the iron and steel scrap trade.

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Wilbur G. Hudson has been appointed chief engineer of the Pershing road, Chicago, plant of Link-Belt Co. He entered employ of the company in the Philadelphia plant and subsequently became general superintendent of erection. Later he was president of the Wilbur G. Hudson Corp., active in elevating, conveying and general contracting work. Outside of his work in materials handling, he has been vice president and chief engineer of the Curtiss-Wright Airport Corp., in charge of design and construction of this company's airports.

□ □ □

E. W. Wagenseil has been appointed general sales manager of the Hagan Corp., Pittsburgh, and its subsidiaries—the Buromin Co., Hall Laboratories Inc. and Calgon Inc. He was engaged in sales and engineering work in the stoker field for a number of years before taking charge of air preheater sales for the Blaw-Knox Co. in 1927. Two years ago he joined the sales department of Hagan Corp., handling combustion control and boiler water conditioning systems.

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Dana Summers has been elected president of the Chicago Steel & Wire Co., Chicago. Loren F. Collins is vice president and A. W. Nelson secretary and treasurer. H. E. Johnson has been named assistant secretary and assistant treasurer.

Messrs. Summers, Collins, H. R. Bliss, A. T. Carton and T. J. King have been re-elected directors.

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Ralph G. Caulley has joined the Detroit district sales office of Republic Steel Corp., Youngstown, O., Previously for 14 years he was associated with the Wheeling Steel Corp., Wheeling, W. Va., the latter half of this period in the Detroit district.

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R. E. Risley, formerly head of the Standard department, Goslin-Birmingham Co., Birmingham, Ala., is now associated with Jones Associated Engineers Inc., Conway building, Chicago. For ten years was connected with the Stockham Pipe & Fittings Co., Birmingham, as research engineer, chief engineer, assistant foundry superintendent and superintendent of the inspection department.

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J. A. Sisto has been elected president and chairman of the board of the Barium Steel Corp., Canton, O., manufacturer of blooms, billets, sheet bars and rounds in special alloy and carbon steels.

C. E. Middleton is vice president and general manager; C. F. Norsworthy secretary, and L. C. Miller treasurer. Board of directors includes Messrs. Sisto, Middleton, Norsworthy, E. R. Short, R. F. Danly, C. E. Boyd and C. J. Sisto.

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Charles Schramm, recently appointed assistant manager of sales of the New York office of the American Sheet & Tin Plate Co., Pittsburgh, has been identified with the sheet steel industry for 30 years and, except for a brief period, with his present organization. Born in New York, he early became associated with the old American Tin Plate Co., New York, prior to its absorption by the American Sheet & Tin Plate Co. Except for one year in the operating department, his entire experience has been in sales promotion and in 1919-20 he served as manager of sales for Stieglitz-Trei-

Charles Schramm

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# EDITORIAL

## Labor Crisis Is Due To Bungling by Amateurs

BACK in the days when building construction was active, it was not uncommon for the owner or contractor of a building to pay tribute to a union labor representative for "protection." Payment of the fee, which sometimes was as much as $100,000 for a large or important structure, entitled the payer to security from "explosions" and other "accidents" and from "preventable" strikes. Sometimes jurisdictional strikes could not be prevented, even by payment of tribute.

More recently, plate glass windows have been broken repeatedly in stores where the glass has not been put in by union glaziers. The practice has become so general in certain localities that the insurance rates on plate glass windows have doubled and trebled.

Racketeering of a similar kind is known in almost every field of business. Sabotage, bombing, assault and occasionally murder have been resorted to for the purpose of forcing recalcitrants to bow to the will of the unions.

Such tactics are not advocated by the American Federation of Labor. Nevertheless, labor racketeering has flourished in many units of the federation, and any action which the leaders may have taken to discourage racketeering has had little appreciable effect.

### Members of Unions Often Are Exploited by Tyrannical, Dishonest Local Officers

The treatment of members of labor unions by their local officers often is cruel and oppressive. The regulations are written in such a way that an unscrupulous official can suspend, expel or fine a member upon the flimsiest of pretexts.

In many union organizations, officials receive large incomes which cannot be justified by the character of their duties. Frequently the funds of the union are handled loosely. In some cases the leaders of a local have developed the technic of exploiting its dues-paying members to the point of downright robbery. A thorough investigation of the administration of local unions probably would show scores, or possibly hundreds of cases of coercion of workers by union officials to every authenticated case of coercion by employers.

The conditions in a great many locals of the union organizations reek of graft, thuggery, and tyranny. Clean, well managed and honestly administered locals are the exception rather than the rule.

Yet in spite of these facts (which are well known to industry and which constitute the real reason why unions, unaided, never had been able to make marked headway in the metal-working industries) President Roosevelt, General Johnson and other new dealers have openly embraced unionism and are trying to force it upon the nation.

By deliberately refusing to clear up ambiguities in Section 7a of NIRA, they encouraged union labor leaders to misrepresent the intent of the act. For eight months the administration has done everything possible to lead labor unionists into believing that they could ride roughshod over industry.

### Administration Erred in Promoting Trouble Where Harmony and Understanding Prevailed

And now, union labor not having capitalized upon this opportunity to the extent it had anticipated, the government is attempting to go a step further. It openly proposes to foist the closed, union shop upon the nation's industries.

And what diabolical methods are being employed to pave the way! How unfair was General Johnson's intimation that "99 times out of 100" a employe representation plan does not give the workers a free choice of representation! How sickening his praise of a few labor leaders, at the expense of "any Frankenstein that you may hurriedly build under the guise of a company union"! And what an insult to the intelligence and common sense of the great majority of American workers is the administration's proposal that all must bow to the will of a minority—to become parties to a great racket!

The present critical state of labor conditions is entirely artificial. It is the synthetic product of bungling by amateurs in Washington. The majority of strikes which have occurred or which now threaten can be attributed directly to needless meddling by the government.

Industry must marshal its resources to place its case before the administration in unmistakable terms. Now is the time to convince the President and his aides of the terrible mistake they are making. The Wagner bill must be defeated, or modified sufficiently to insure the country from being delivered into the slavery of racketeering!

# THE BUSINESS TREND

## Business Retarded Only by Government Policies

ASIDE from the unbalanced state of industry and the restraints attributed to certain government policies, business continues to improve moderately. Most of the monthly figures for February were favorable, and the weekly barometers show steady advances for the first half of March.

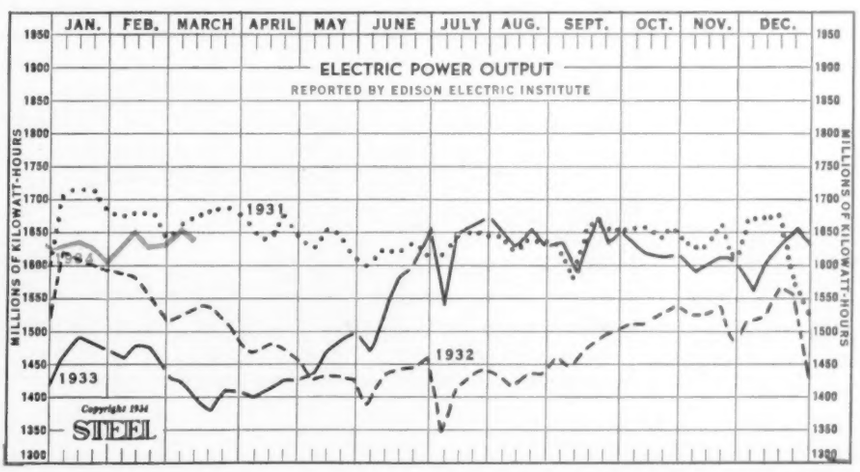
Car loadings continue to mount encouragingly, and since early in February have been running well above the 1933 and 1932 trend lines. In the week ending March 10, loadings on the New York Central were the largest since October, 1931. Electric power output, while down slightly from the previous week, was 18.4 per cent ahead of that of the corresponding week last year.

The outlook in the heavy equipment field is more encouraging. Inquiries for electric cranes have been more numerous in recent weeks. Orders for rolling mill equipment and accessories have gained in the last month. Moreover, the appointment of a committee to act on problems of the durable goods industries—a development arising from the recent meeting of NRA code authorities—gives promise that more intelligent treatment may be accorded these lagging industries by the federal administration.

Chief of the factors restricting business at the present time is labor unrest and uncertainty as to the real intent of the administration in regard to labor policies. Strike trouble has definitely retarded operations in the automobile industry, and the effect is being felt in other industries closely allied with automobile activities. The threat of the Wagner bill, which is of more concern to industry than the obnoxious securities control bill, creates a cloud of uncertainty which may bring serious consequences unless the labor problem is brought to a satisfactory decision soon.

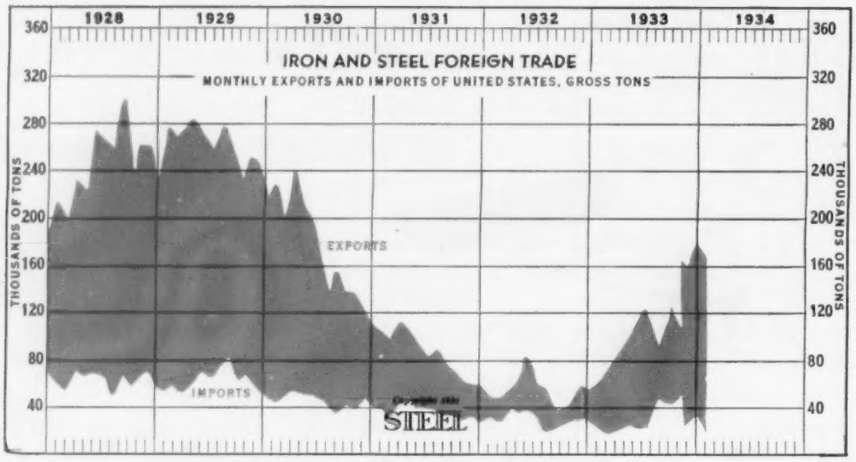
### Increased Wages—Offset to Synthetic Labor Trouble—Mean Higher Prices to Consumer

Price increases for many products cannot be held back much longer. Pending the recent NRA meetings, producers were reluctant to post higher prices, although their costs would have justified rather stiff advances. The current wave of wage increases changes the situation, and inevitably will lead to early revisions in prices.




| 1934 | |
|---|---|
| **Million Kw.—Hr.** | |
| March 10 .. | 1,647 |
| March 3 .... | 1,658 |
| Feb. 24 .... | 1,646 |
| Feb. 17 .... | 1,640 |
| Feb. 10 .... | 1,651 |

| 1933 | |
|---|---|
| **Million Kw.—Hr.** | |
| March 11 .. | 1,390 |
| March 4 .... | 1,422 |
| Feb. 25 .... | 1,425 |
| Feb. 18 .... | 1,469 |
| Feb. 11 .... | 1,482 |




**Exports**

| | Tons |
|---|---|
| January, 1934 | 178,023 |
| December, 1933 | 184,585 |
| January, 1933 | 56,720 |

**Imports**

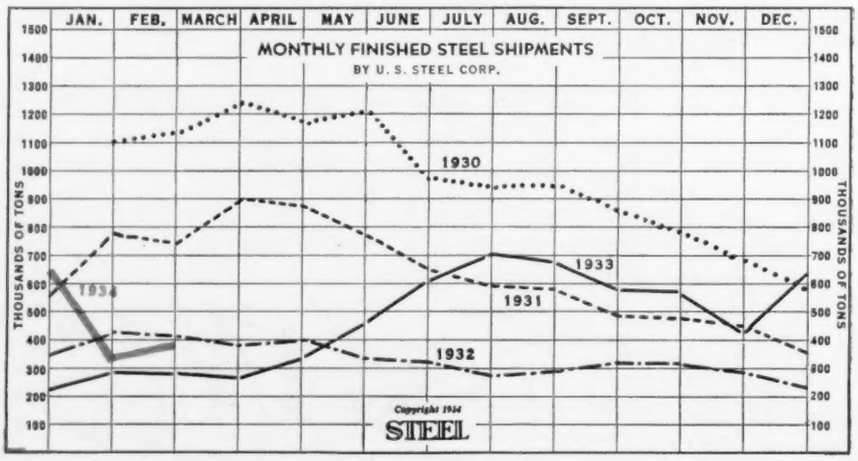
| | Tons |
|---|---|
| January, 1934 | 22,653 |
| December, 1933 | 31,310 |
| January, 1933 | 21,892 |

## Iron and Steel Foreign Trade Off Slightly Due to Reduced Scrap Shipments

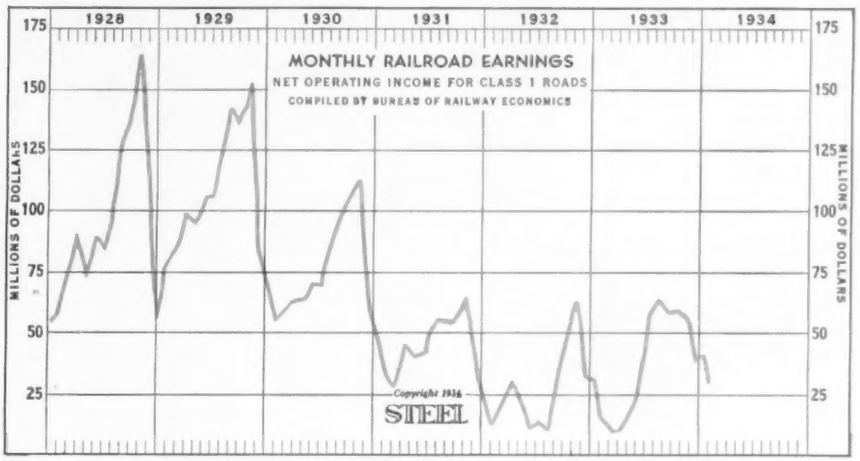
Iron and steel exports of the United States in January totaled 178,023 gross tons, a slight reduction from the 184,585 tons shipped in December, but more than triple the exports of 56,720 tons of January, 1933. This decline in exports was largely due to the reduction of scrap shipments which fell off nearly 14,000 tons during January. According to the iron and steel division, department of commerce, scrap, in spite of the sharp decline, retained its position as the largest item of export in January. The upward trend of imports in December was short lived and January imports, at 22,653 tons, were the smallest since March, 1933, when only 22,114 tons were received from foreign ports. Imports in January, a year ago, totaled 21,892 gross tons.

## Finished Steel Shipments Point Upward in February

Finished steel shipments by the United States Steel Corp. increased during February, according to the monthly report of the corporation. Total shipments for the month were 385,500 tons, an increase of 53,723 tons compared with a movement of 331,777 in January. In February, 1933, shipments totaled 275,929 tons. For the first two months of this year shipments totaled 717,277 tons against 561,067 tons for the corresponding period of 1933. Year-end adjustments in shipments have resulted in the addition of 44,283 tons to the total for 1933. This brings the 1933 movement to 5,805,235 tons against 3,974,062 in 1932. With operations climbing to higher levels, shipments in March are expected to show a substantial gain over the February movement.




| | Tons |
|---|---|
| February, 1934 | 385,500 |
| January, 1934 | 331,777 |
| February, 1933 | 275,929 |



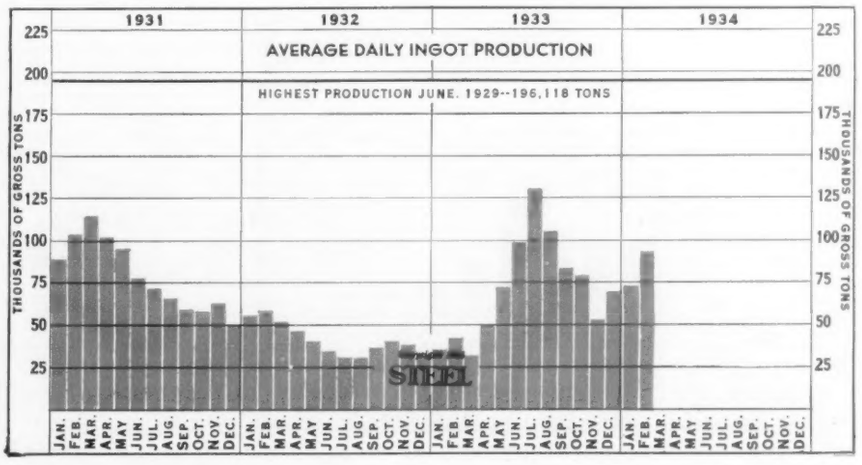

| | |
|---|---|
| January, 1934 | $30,931,205 |
| December, 1933 | 37,763,879 |
| January, 1933 | 13,585,010 |

## Railroads in January Earn at Annual Rate of 2.16 Per Cent

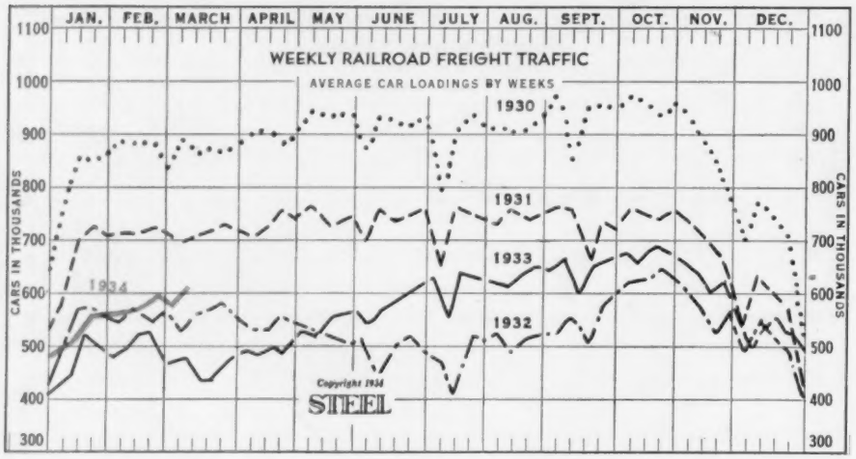
The net railway operating income of the Class I railroads in January amounted to $30,931,205, which was at the annual rate of return of 2.16 per cent on their property investment, according to complete reports filed by the carriers with the Bureau of Railway Economics. In January, a year ago, net operating income amounted to $13,585,010 or 0.94 per cent on property investment. Operating expenses in January totaled $195,848,887 compared with $181,679,760 in the same month last year or an increase of 7.8 per cent. This compilation as to earnings in January is based on reports from 149 Class 1 railroads representing a total mileage of 239,511 miles.

## February Ingot Production Climbs; Total Output Double a Year Ago

Steel ingot production advanced sharply in February, according to the monthly statistical report of the American Iron and Steel institute. Production for February totals 2,224,698 tons, or 92,696 tons a day. This compares with 1,996,897 tons or a daily average of 73,959 tons in the preceding month. In February, 1933, output was calculated at 1,086,867 tons and a daily average of 45,286 tons. Operations in February, averaging 42.78 per cent of capacity, were the highest since last August and compare with 34.13 per cent in January and 20.83 in February, 1933. In two months, ingot production totals 4,221,595 tons or almost double the 2,116,942 tons of the same period of 1933.




| | Tons |
|---|---|
| February, 1934 | 92,696 |
| January, 1934 | 73,959 |
| February, 1933 | 45,286 |



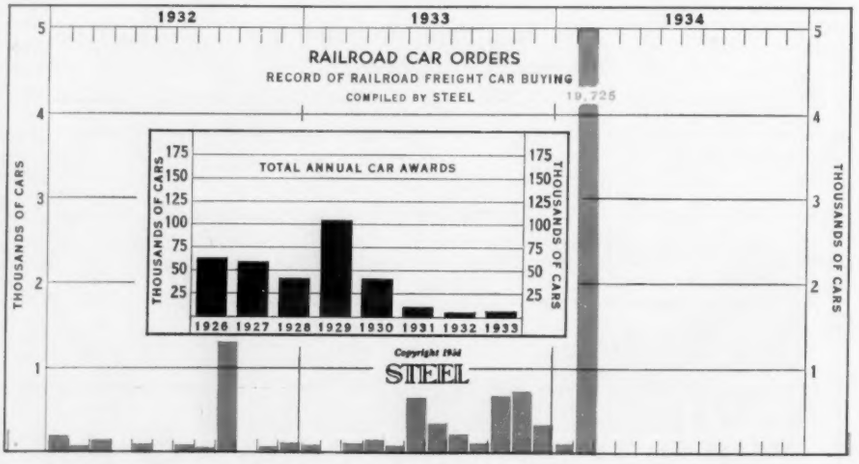

| | 1934 | 1933 |
|---|---|---|
| March 3 | 604,137 | 481,208 |
| Feb. 24 | 573,371 | 462,315 |
| Feb. 17 | 598,896 | 517,529 |
| Feb. 10 | 572,504 | 504,663 |

## Freight Car Loadings Advance Sharply; Exceeds 1932 Movement

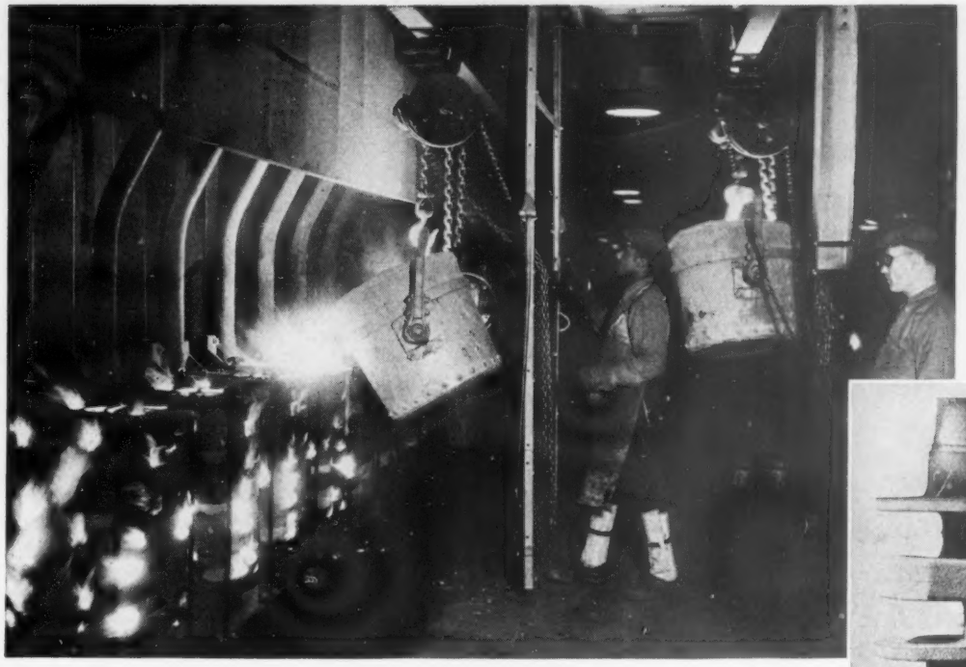
Loading of revenue freight in the week ending March 3 totaled 604,137 cars, according to the weekly report of the American Railway association. This was an increase of 30,766 cars over the previous week, 122,929 above the movement in the like week of 1933, and 44,658 over the corresponding week of 1932. The total for the week ended March 3 brought total loadings for the year to date to a point where they exceeded the corresponding 1932 period for the first time. Cumulative total for 1934 has consistently exceeded 1933 but heretofore has been under the like period two years ago. The figure for week ending March 3 set a new peak for weekly loadings to date in 1934.

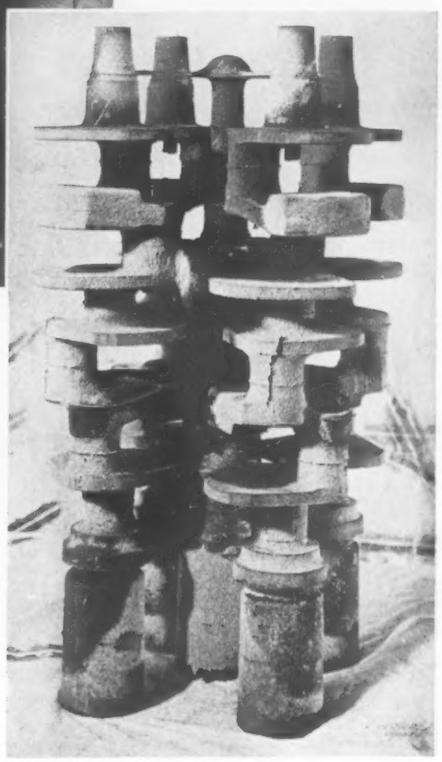
## February Freight Car Awards Highest in Past Ten Years

Domestic freight car awards in February totaled 19,725 cars, the largest monthly total since September, 1924, when orders were placed for approximately 22,000 cars. As awards for only 152 were made in January, the total for the first two months of this year was 19,877, against three in the corresponding period of last year, 194 in the first two months of 1932 and 150 in the same period of 1931. The February awards were composed of three major lots: 12,725 for the Van Sweringen lines; 6500 on which the Pennsylvania got final approval for construction in its own shops; and 500 for Lehigh and New England. Considerable more buying of freight cars is in prospect.




| | |
|---|---|
| February, 1934 | 19,725 |
| January, 1934 | 152 |
| February, 1933 | 0 |





# MAKING THE FORD CAST ALLOY CRANKSHAFTS

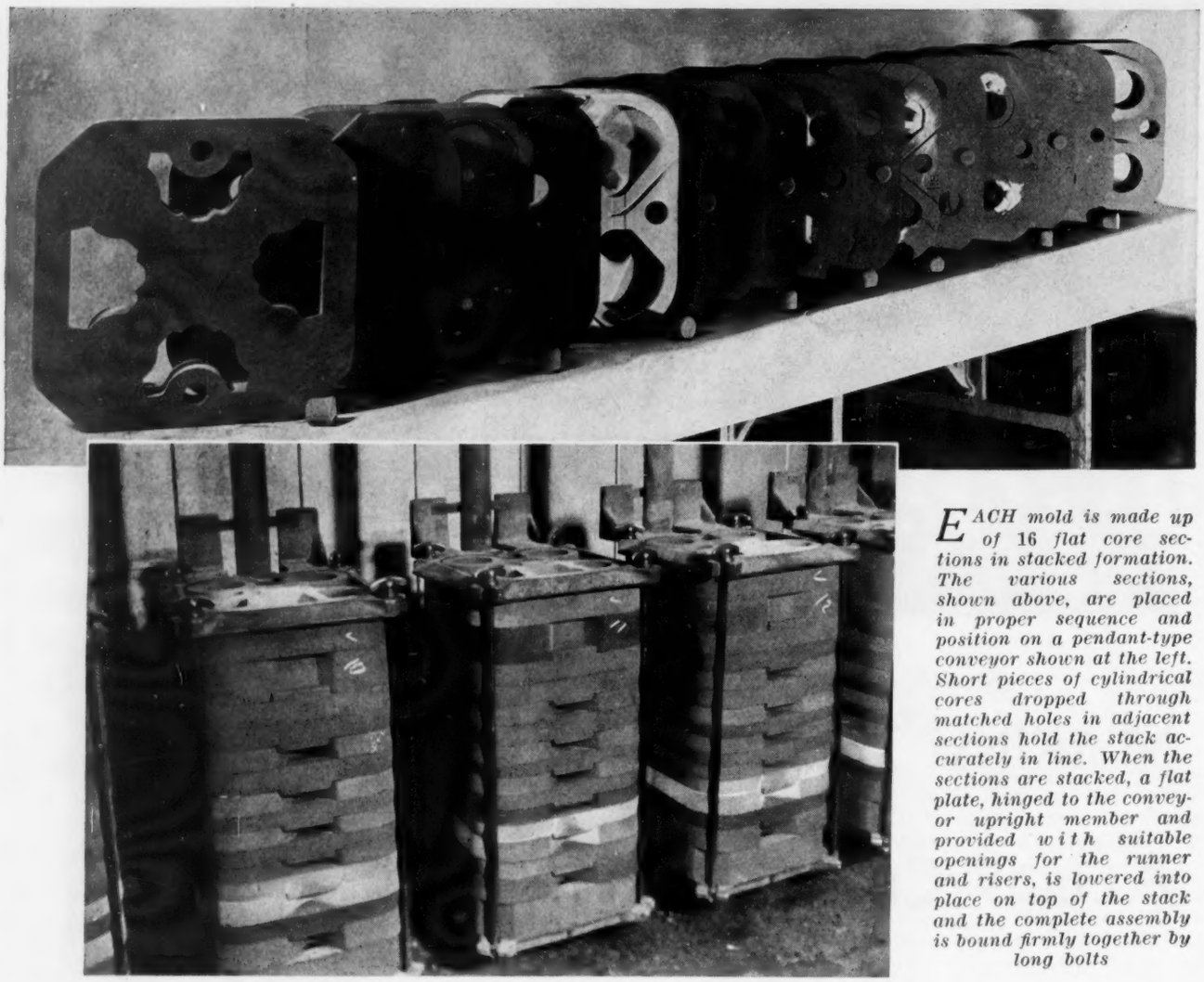
BY PAT DWYER

**MOLDS are carried on a conveyor and as they pass the pouring station, shown at the upper left, they are filled with metal from a 1500-pound capacity ladle suspended from a chain hoist. Each ladle pours three molds, each mold containing four crankshafts. Pouring time is 45 seconds. A cluster of shafts as shaken from the mold is shown at the lower right; as compared with the pouring position, top and bottom are reversed. The cluster weighs 421 pounds and is poured from a large central runner connected by suitable gates at a point about halfway between top and bottom. The feeding risers which extend to the top of the mold are 4 inches in diameter**

DEVELOPMENT of the cast alloy crankshaft for automobile engines is attracting widespread interest at present, for, since the beginning of the automotive industry more than a quarter of a century ago, use of forged steel shafts has been orthodox. Once again, through competitive and other influences peculiar to itself, the motor car industry initiates a practice of revolutionary nature, a practice which may bear considerable import to internal combustion engine and machinery manufacture in general.

In placing its 1934 V-8 car on the market, the Ford Motor Co. pioneered the application of a cast alloy crankshaft possessing marked advantages over the previous type of shaft. In this connection, it can be stated that constant pressure on engineers to reduce weight, increase physical properties and reduce manufacturing costs, has keyed inventive faculties to the highest pitch and has forced automobile makers to venture into hitherto unexplored fields for solution of problems formerly considered outside the range of practical accomplishment.

Continued growth of the Ford Motor Co. to its present extensive proportions is due in large measure to this pioneering spirit which realizes that nothing is so perfect that it cannot be improved to some extent. Intensive, incessant and insatiable investigation is carried on by the personnel of a research department. Radical and at times extraordinary ideas are received or conceived here and after due—and sometimes prolonged—periods of in-



*EACH mold is made up of 16 flat core sections in stacked formation. The various sections, shown above, are placed in proper sequence and position on a pendant-type conveyor shown at the left. Short pieces of cylindrical cores dropped through matched holes in adjacent sections hold the stack accurately in line. When the sections are stacked, a flat plate, hinged to the conveyor upright member and provided with suitable openings for the runner and risers, is lowered into place on top of the stack and the complete assembly is bound firmly together by long bolts*

cubation are translated into actualities. The incubation period in the laboratory usually is followed by an experimental period in the shops, where unforeseen obstacles pop up with perversity.

For example, the present cast crankshaft produced in large numbers in the Ford foundry at the River Rouge works is the outcome of intermittent experimental effort over the past five years. One line of experiment was devoted to a method of molding the castings, while a second line, which necessarily had to synchronize with the first, was devoted to the production of a suitable metal. That the proposed objective has been attained is apparent from the fact that the cast crankshafts are believed to be superior in practically every respect to the forged steel shafts formerly placed in Ford engines.

Before the present crankshaft was placed on a production basis and fed as a routine product into the assembly line, approximately 2000 shafts had been placed in cars where their behavior could be checked closely. These were installed in service cars and other vehicles operated by the Ford company, and outside cars operating in the Detroit area and easily accessible for purposes of examination.

The majority of these crankshafts have been in constant service for at least two years, while others have been in use for varying periods up to five years. None has failed in service due to distortion or appreciable wear, and none has shown defect of fiber stress or crystallization usually associated with ferrous metal subjected to constant revolution and vibration, and known as fatigue of metal.

### Alloy Has High Carbon

Composition and subsequent heat treatment of the casting apparently renders it immune, at least within practical operating limits, to the fatigue factor which materially lowers the life expectancy of a forged steel shaft. Long life of the cast shaft is ascribed to the comparatively high carbon as well as its alloy content (approximately 1.35 per cent carbon), and to form and distribution of the carbon throughout the mass. The carbon also to some extent provides some lubrication.

Metal in the crankshaft partakes somewhat of the characteristics of steel, of gray iron and malleable iron and therefore cannot be classified under any of these headings. For the same reason the carbon evades any exact classification, but some exists in a state comparable to the temper carbon in malleable iron. It is understood that the material has been classified by the United States patent office as a "high-carbon alloy steel."

In this connection, it is interesting to note that the use of alloys in ferrous foundry practice has increased so rapidly in recent years that nomenclature has lagged behind. The American Foundrymen's association at present has a committee working on nomenclature for the wide variation of steel castings. A committee for a similar purpose in the malleable iron field is in process of formation. Eventually, no doubt, a suitable nomenclature will be evolved to differentiate accurately between mixtures with a gray iron base, but in which the physical properties are changed due to the addition of various alloys.

The metal charge for the cast crankshaft is made up of approximately 50 per cent steel scrap and

50 per cent return crankshaft scrap, that is, metal from the gates and risers. Suitable amounts of various alloys are added to produce a metal of the following analysis: Carbon 1.25-1.40 per cent; manganese 0.50-0.60 per cent; silicon 1.90-2.10 per cent; chromium 0.35-0.40 per cent; copper 2.50-2.75 per cent; phosphorus 0.10 per cent maximum; and sulphur 0.06 per cent maximum.

### Duplex Melting Method

Originally the metal was melted in an electric furnace, but recently a duplexing method has been developed in which the metal is melted in the cupola, tapped into an air furnace and then drawn off as required. The air furnace has a holding capacity of 30 tons. Each of the two cupolas has a melting capacity of 14 tons per hour, sufficient to supply metal for an anticipated production of 4800 crankshafts per day. The coremaking process operates on three 8-hour shifts per day, while each cupola is in blast alternately for 16 hours (two shifts) during which the casting operations are in progress. While one cupola is in use, the other is being cooled and repaired.

A long curved trough or spout is connected at one end to the breast of the cupola. Both spouts are merged into one at some distance from the cupolas and the single spout continuation is connected to an opening at the side and near the back end of the air furnace.

In effect, the air furnace is like a small continuous open hearth in which the temperature and composition of the metal may be controlled closely. Obviously also, the composition of metal prepared in large volume on a shallow hearth will approach absolute uniformity more nearly than metal prepared in any other manner. A quick test taken at frequent intervals provides the necessary check in maintaining the metal at the required temperature and analysis.

*A rough grinding operation is performed on each casting in this automatic grinder. Actuated by a series of cams, the machine begins at one end and grinds each contour successively while the shaft revolves on its axis*

Metal is taken from the furnace in 1500-pound capacity ladles suspended from chain hoists on a monorail extending from the furnace to the pouring area near the conveyors on which the molds are carried. Each ladle of metal is sufficient to pour three molds, each mold containing four crankshafts.

The comparatively massive character of the gates and risers may be inferred from the fact that the four clean castings weigh 260 pounds, while the total amount of metal poured in each mold is 421 pounds. At a temperature of 2500 degrees Fahr., the pouring time for each mold is 45 seconds.

### Molds Have 16 Sections

Each mold is made up of 16 flat core sections in stacked formation, as shown in the accompanying illustrations. The crankshafts are poured in a vertical position from a large central runner connected by suitable gates at a point about half way between the top and the bottom. The top of each crankshaft is expanded to a diameter of 4 inches to form a feeding riser which extends to the top of the mold. The method of gating and feeding may be observed from accompanying illustrations showing the castings as shaken from the mold and after being broken apart.

As cast, the crankshafts resemble malleable iron at the same stage, in that the metal is white, brittle and easily broken. A comparatively simple heat treatment transforms the metal into a material that is almost impossible to break. The castings are placed in a furnace and raised

(*Please turn to Page* 53)

*Here are shown four crankshafts after the central runner and feeders have been broken off. Four clean castings weigh 260 pounds, while the total amount of metal poured is 421 pounds. As cast, the metal is white, brittle and easily broken; by heat treatment, it is transformed into a material of great strength*

# The Plastic Forming Of Metals

By PROFESSOR DR.-ING ERICH SIEBEL
Translated by JOHN H. HITCHCOCK

## Part III—Investigations of Distribution of Deformation and Stress in Technical Forming Processes

### 1. Condition of Deformation After Termination of Forming*

DEFORMATION of a body element bounded by mutually perpendicular surfaces, as Unkel[68] already has described, can be resolved into a deformation normal to the bounding surfaces of the element and additional shear deformations. If the boundaries are so selected that two opposite limiting surfaces lie perpendicular to a direction of principal stress, as is the case, if a limiting surface lies in a plane of symmetry; then shear deformations are possible only in the planes which are normal to the limiting surfaces.

In each continuous forming process, moreover, the same curvature must exist after the forming in all cross sections lying perpendicular to the axis of the bar; because all fibers certainly undergo the same elongation in the direction of the axis of the bar. Accordingly, if a cross section, A-A, is curved after forming by rolling, as shown in Fig. 118, the condition of deformation existing at each point of the bar thereby is determined.

Investigation of the distortion to which a co-ordinate system, constructed of unit intervals in the longitudinal and transverse sections, is subjected during deformation, shows according to Fig. 118, that the deformation during the forming process occurs as a simple elongation, corresponding in amount to the reduction of cross-sectional area of the bar, only in the direct vicinity of the axis of the bar. All body elements not lying at the axis of the bar must indeed undergo the same elongation in the direction of the axis, because of the cohesion of the material; but additional displacements (shear deformations) parallel to the axis nevertheless occur, which usually have their highest values at the points where the direct effect of the forming tool is applied.

Elongation and additional shear deformation at each particle now produce a total deformation which differs in magnitude and direction from that of a particle at the axis of the bar. This total deformation can be determined in a simple manner by considering the deformation condition of a sphere, which is so located in the particle that it is tangent to each limiting surface, and which participates in the deformations and displacements of the particle. Such a sphere then assumes the form of an ellipsoid, the principal axes of which designate the principal deformations. The ellipsoid remains inscribed in the distorted particle after the deformation.

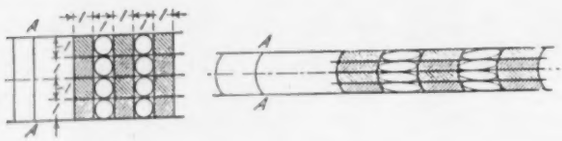


*Fig. 118—Process of deformation*

The ellipsoid of deformation can be determined in the following manner, referring to Fig. 119. The sphere is first transformed, by a deformation which corresponds to the alteration of the principal dimensions of the entire body in question, into an ellipsoid in which the position of the principal axes coincides with that of the body as a whole. This ellipsoid then is converted into the final form by means of a displacement (shear deformation) through an angle corresponding to the cross-sectional distortion. The ellipsoid remains equal in volume to the initial sphere, so that the condition exists:

$$\pi \times r_0^3 = \pi \times a \times b \times c = \pi \times r_1 \times r_2 \times r_3 \quad \ldots\ldots (64);$$

in which $r_0$ represents the radius of the initial sphere; a, b and c designate the radii of the ellipsoid of deformation before the additional displacement; and $r_1$, $r_2$ and $r_3$ represent the radii of the ellipsoid after the displacement.

From Fig. 119 it follows that the diameters, A-A and B-B, are conjugate diameters, because the tangents at their ends are parallel to the conjugate diameters. The ellipsoid of deformation therefore can be constructed in a simple manner, according to Ritz' construction of the axes.

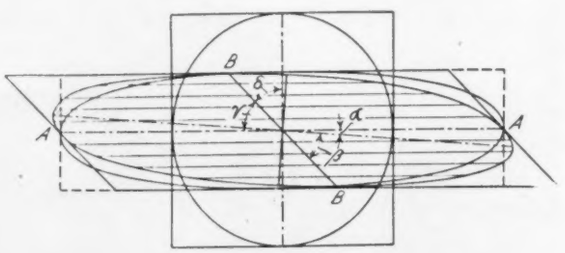


*Fig. 119—Ellipsoid of deformation*

However, the lengths and directions of the axes also can be calculated from the relations between the conjugate diameters.

If the conjugate diameters, $2a_1 = 2a$ and $2b_1 = 2b/\sin \Upsilon$, form the acute angles $\alpha$ and $\beta$ with the major principal axis of the ellipsoid of deformation, and if the experimentally established angle of inclination between the two conjugate diameters is designated as $\Upsilon = (\alpha + \beta)$, then:

$$r_1 = \pm \sqrt{\frac{a_1^2 + b_1^2}{2} + \frac{1}{2}\sqrt{(a_1^2 + b_1^2)^2 - 4\,a_1^2\,b_1^2 \sin^2 \Upsilon}} \quad \ldots\ldots (65a)$$

$$r_2 = \pm \sqrt{\frac{a_1^2 + b_1^2}{2} - \frac{1}{2}\sqrt{(a_1^2 + b_1^2)^2 - 4\,a_1^2\,b_1^2 \sin^2 \Upsilon}} \quad \ldots\ldots (65b)$$

$$\tan \alpha = -\tan \Upsilon \left(\frac{r_2^2}{r_1^2} - 1\right) + \frac{1}{2}\sqrt{\tan^2 \Upsilon \left(\frac{r_2^2}{r_1^2} - 1\right)^2 - 4\,\frac{r_2^2}{r_1^2}} \quad \ldots\ldots (66).$$

*Developed according to E. Siebel and H. Huhne[100].

The deformations in the three principal directions of deformation are then given in longarithmic form as:

$$\phi_1 = \log_e \frac{r_1}{r_0} \quad \text{.....(67a)}$$

$$\phi_2 = \log_e \frac{r_2}{r_0} \quad \text{.....(67b)}$$

$$\phi_3 = \log_e \frac{r_3}{r_0} = \log_e \frac{c}{r_0} \quad \text{.....(67c).}$$

In order to evaluate this knowledge practically, it first is necessary to obtain corresponding experimental data concerning the methods of working of the individual forming processes. The investigations for this purpose include forming by means of drawing, extrusion, piercing and rolling. For these tests, an arrangement was chosen which had already been used in a similar manner by Nielsen and Gelbhaar[88], as well as by W. Riedel[89]. After rough preparation, the test bodies were sawed open along a plane of symmetry. The inside surfaces were planed and fitted together, and the bar then was machined to size. Then the longitudinal and transverse lines of the co-ordinate network were milled in, or impressed by means of a stencil, at intervals of 0.079-inch on one parting surface.

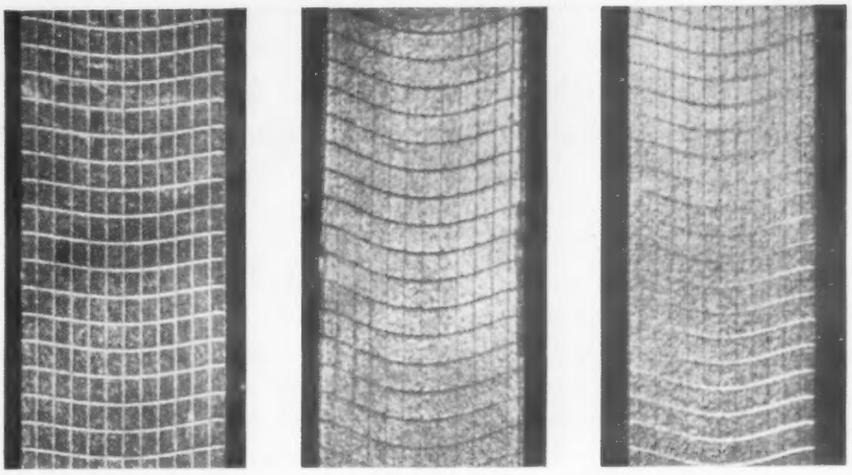
### Die Angles Varied

DRAWING TESTS. The drawing tests were carried out on copper bars with varying die angle and varying reduction of cross-sectional area; in order to acquire an insight into the manner in which the relations of deformation are affected by these two factors, and to derive some conclusions regarding the condition of deformation which exists at higher degrees of deformation. Round bars having initial diameters of 0.925-inch and 0.984-inch, split longitudinally, were drawn in a 22,000-pound testing machine to a final diameter of 0.787-inch, through dies having opening angles of 12, 24 and 40 degrees. After the tests, the separate halves of the bars were photographed with double magnification (Figs. 120 to 125), and the deformations of the individual parts of the cross sections were calculated from the distortion of the co-ordinate system.

An insight into the probable magnitudes of the displacements can be easily obtained from the form of the cavity in the end surface of the bar, because this probably is parallel to the transverse lines of the bar. However, as Fig. 125 shows, the displacements thus determined are somewhat too high, because the last part of the bar is bent inward, due to the lack of support where the cavity exists.

[88] L. Weiss: Leistungsberechnung des Walzvorganges; Z. Metallk. 17 (1925)p.229.

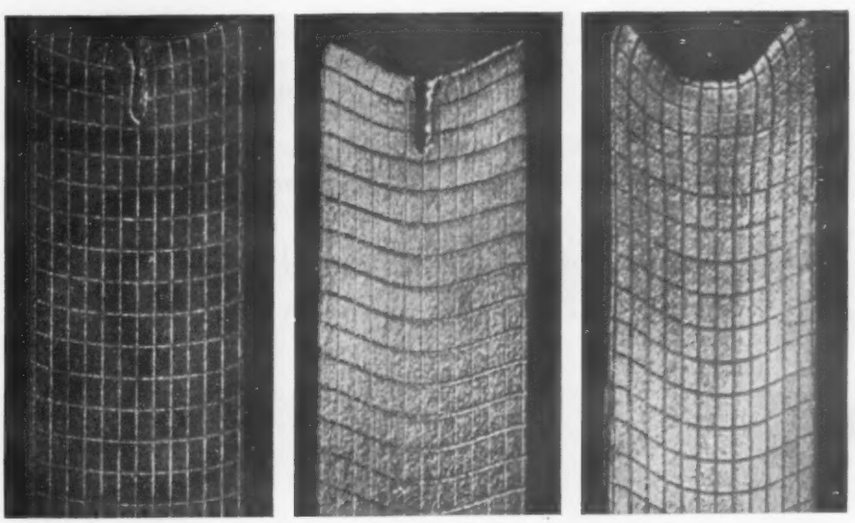
[89] W. Riedel: Das Aufquellen geologischer Schmelzmassen als plastischer Formanderungsvorgang; Neues Jahrbuch fur Mineralogie, Geologie und Palaontologie, Supp. vol. 62(1929)p.151.



*Figs.* 120, 121 *and* 122—*Drawing tests on copper bars with* 27.8 *per cent reduction of area*

The results of this test series are summarized in Table XIV. Column 1 indicates the reduction of cross-sectional area, column 1a the shape of die, column 2 the average distance of the strip in question from the bar axis, after the draw. Columns 3 and 4 serve for the determination of the angle of displacement. The latter values are averages, determined from four measurements at two different cross sections on the right and left sides of the axis of the bar. The angle of inclination $\alpha$, which the principal direction of deformation forms with the central axis for a given elongation (column 7), then can be calculated according to equation (66), and is recorded in column 5. The tangent of this angle is shown in column 6. In column 8, the total deformation due to the displacement and the elongation is determined according to equation (67). From the summary it appears that the total deformations first increase with increasing distance from the central axis, where pure elongation prevails. With severe reduction of area and small opening angles of the dies (Fig. 123), the deformations increase up to the edge, but otherwise a decrease is observed in the outer zone (Figs. 120 to 122, 124 and 125).

If the die angle increases, the elongation remaining unaltered, the additional shear deformations are increased; that is, the internal forming losses become higher. In this respect, the results of drawing tests undertaken by A. Pomp, E. Siebel and E. Houdremont[35] on steel wires, with dies of 6, 12, 24 and 40-degree opening angles, are also pertinent. If the values of tensile strength after the draw, which were determined in these tests, are plotted as a function of the elongation or of the reduction, it shows according to Fig. 126 that the tensile strength for the same reduction grows with increasing opening angle. This can be attributed only to greater deformations resulting from greater displacements with increasing die angle, because the initial material is identical and must



*Figs.* 123, 124 *and* 125—*Drawing tests on copper bars with* 36.2 *per cent reduction of area*

**Table XIV**

## Influence of Reduction of Area and Shape of Die on Deformation Relations in Deep-Drawn Copper Bars

| 1 | 1a | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| | | | Displacement angle | | Inclination angle | | Stretching $\log_e \lambda$ | |
| Reduction of area per cent | Opening angle degree | Distance from center line inches | $\delta$ degree | $\tan \delta$ | $\alpha$ degree | $\tan \alpha$ | per cent | Total deformation $\phi_1$ per cent |
| 27.8 | 12 | 0.371 | 6.0 | 0.105 | 3.4 | 0.058 | 32.2 | 33.0 |
| | | 0.304 | 8.8 | 0.155 | 5.3 | 0.092 | | 33.6 |
| | | 0.236 | 8.8 | 0.155 | 5.3 | 0.092 | | 33.6 |
| | | 0.168 | 8.3 | 0.146 | 4.7 | 0.082 | | 33.0 |
| | | 0.102 | 5.3 | 0.093 | 3.2 | 0.056 | | 32.6 |
| | | 0.034 | 2.9 | 0.050 | 1.7 | 0.030 | | 32.4 |
| 27.8 | 24 | 0.371 | 8.6 | 0.150 | 5.0 | 0.088 | | 33.5 |
| | | 0.304 | 15.0 | 0.270 | 8.7 | 0.153 | | 34.8 |
| | | 0.236 | 14.7 | 0.262 | 8.3 | 0.146 | | 34.5 |
| | | 0.168 | 14.0 | 0.250 | 8.0 | 0.140 | | 34.4 |
| | | 0.102 | 8.9 | 0.158 | 5.3 | 0.092 | | 33.6 |
| | | 0.034 | 3.6 | 0.060 | 1.7 | 0.032 | | 32.7 |
| 27.8 | 40 | 0.371 | 7.7 | 0.135 | 4.7 | 0.082 | | 33.6 |
| | | 0.304 | 21.0 | 0.384 | 11.3 | 0.200 | | 36.6 |
| | | 0.236 | 21.0 | 0.348 | 11.3 | 0.260 | | 36.6 |
| | | 0.168 | 15.7 | 0.281 | 9.0 | 0.160 | | 34.9 |
| | | 0.102 | 11.0 | 0.194 | 6.7 | 0.118 | | 34.0 |
| | | 0.034 | 4.7 | 0.082 | 2.8 | 0.050 | 32.2 | 33.0 |
| 36.2 | 12 | 0.350 | 15.1 | 0.271 | 5.5 | 0.095 | 44.3 | 46.1 |
| | | 0.287 | 9.7 | 0.170 | 3.7 | 0.064 | | 45.5 |
| | | 0.223 | 8.1 | 0.142 | 3.2 | 0.055 | | 45.3 |
| | | 0.159 | 6.7 | 0.117 | 3.0 | 0.050 | | 45.2 |
| | | 0.096 | 3.4 | 0.061 | 1.3 | 0.022 | | 45.0 |
| | | 0.032 | 1.1 | 0.020 | 0.7 | 0.010 | | 44.7 |
| 36.2 | 24 | 0.350 | 12.6 | 0.222 | 4.8 | 0.083 | | 45.9 |
| | | 0.287 | 17.6 | 0.315 | 6.6 | 0.114 | | 46.5 |
| | | 0.223 | 18.9 | 0.344 | 7.0 | 0.123 | | 46.9 |
| | | 0.159 | 16.5 | 0.296 | 6.3 | 0.110 | | 46.2 |
| | | 0.096 | 10.7 | 0.190 | 4.2 | 0.073 | | 45.7 |
| | | 0.032 | 4.2 | 0.073 | 1.8 | 0.031 | | 44.7 |
| 36.2 | 40 | 0.350 | 17.6 | 0.319 | 6.4 | 0.112 | | 46.5 |
| | | 0.287 | 28.0 | 0.532 | 9.4 | 0.164 | | 48.7 |
| | | 0.223 | 27.9 | 0.532 | 9.4 | 0.164 | | 48.7 |
| | | 0.159 | 20.5 | 0.374 | 7.5 | 0.132 | | 47.4 |
| | | 0.096 | 12.6 | 0.225 | 4.8 | 0.084 | | 45.9 |
| | | 0.032 | 4.2 | 0.073 | 1.8 | 0.031 | 44.3 | 44.7 |

therefore show the same flow curve.

Because of the varying magnitudes of deformation in the cross section of the bar, the flow-hardening also must differ in different parts of the cross section; in fact, it must increase from a minimum value at the axis of the bar up to the maximum value of the deformation in the vicinity of the edge. Correspondingly, the hardness of a cross section of wire also must increase from the middle to the edge, if the initial material has the same strength throughout. Although tensile tests by L. Weiss[90], on bars drawn with small die angles, indicated no increase of hardness from the center to the edge, this probably can be attributed to the circumstance that the strength of the material used was not the same in all parts of the cross section before the deformation. To eliminate such influences and to obtain conclusive results concerning the distribution of hardness in drawn bars, the following procedure was adopted. The Rockwell hardness was observed before deformation at many points in a longitudinal section, and the differences between the hardness numbers at the central axis and those at the measured points were added to the actual values which were found after the deformation. The values thus obtained are summarized in Table XV. This table shows conclusively that the hardness increases from the center to the edge. The same result also was reached by O. Schwarz[91], who likewise undertook observations of Rockwell hardness over the cross section of a drawn bar,

[90] L. Weiss: Die Entstehung und Folgen Spannungsunterschieden usw.; Z. Metallk. 20(1928)p.118.

**Table XV**

## Influence of Reduction of Area and Shape of Die on Hardness Distribution in Drawn Copper Bars

| Reduction of area % | Opening angle, degrees | Distance of Impression from Center Line, inches: Left 0.303 | Left 0.169 | Left 0.035 | Right 0.035 | Right 0.169 | Right 0.303 |
|---|---|---|---|---|---|---|---|
| | | Rockwell B Hardness | | | (Corrected Values) | | |
| 27.8 | 12 | 56.3 | 54.0 | 51.5 | 51.7 | 53.8 | 55.8 |
| 27.8 | 24 | 58.3 | 55.3 | 51.7 | 51.9 | 54.8 | 58.1 |
| 27.8 | 40 | 59.7 | 56.0 | 51.3 | 51.6 | 56.4 | 60.3 |
| 36.2 | 12 | 63.8 | 61.3 | 59.7 | 59.8 | 61.1 | 64.1 |
| 36.2 | 24 | 67.0 | 63.9 | 59.7 | 60.0 | 64.6 | 66.7 |
| 36.2 | 40 | 68.4 | 65.6 | 59.7 | 59.9 | 66.8 | 68.6 |

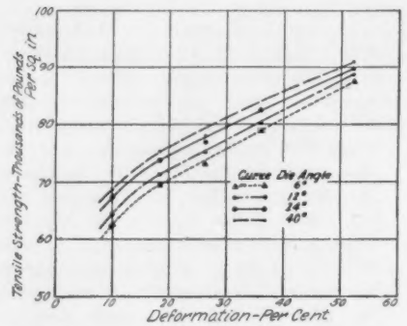



*Fig. 126—Influence of reduction of area and shape of die on strength of drawn steel wires*

in which, however, the statements of the reduction and the die angle are unfortunately lacking. As Table XV shows, the hardness difference between zones at the edge and others at the center increases with increasing die angle. The deformation accordingly must become the more nonuniform, the greater the die angle is.

*(To be continued)*

[91] O. Schwarz: Brinell-, Rockwell-, und Sklersskopharte bei Nichteisenmetallen; Z. Metallk. 28(1930)p.198.

## Establishes Fellowship on Enameling Technology

Mellon Institute of Industrial Research, Pittsburgh, announces that the O. Hommel Co., Pittsburgh, has founded an industrial fellowship in the institute for conducting scientific research on problems of enamel technology.

It is expected that this fellowship will acquire technical information, through its investigations in the laboratory and in plants, supplemented by experience of specialists in the Hommel and co-operating organizations, including Enamelers' Guild, Pittsburgh, that will enable it to serve as a clearing house of dependable facts regarding frits and their industrial use.

Research of the fellowship will be published for the benefit of enamelers; and advice and information on enameling and assistance in solving plant problems and in making evaluations or other practical tests of frits, will be extended gratis to companies wishing such aid.

Jack H. Waggoner, engaged in research on a number of ceramic problems at the institute since 1926, has been named the incumbent of the new fellowship.

# *Long-lasting containers . .*

During the past few years ENDURO, Republic's Perfected Stainless Steel, has proved itself the ideal material for containers of every kind—vats, tanks, trays, kettles and similar industrial equipment.

The advisability of using ENDURO becomes more and more apparent as time goes on, especially where the liquids stored or processed are of a corrosive nature, where they must be kept free from contamination, or where contact with other material might produce a change in chemical content or in taste in the case of dairy, brewery and other food products.

ENDURO is a chromium-nickel* steel—the same long-lasting alloy all the way through. It fabricates easily—can be cut, bent, formed and punched without difficulty—and can be welded by any of the accepted production methods except forge welding. The use of ENDURO welding rod enables the fabricator to produce equipment that has the same resistance to corrosion throughout the finished piece. And for convenience and economy ENDURO is available in all commercial forms and in a variety of finishes.

If you are interested, as a user or a fabricator, write today for complete information.

Inset above: *125-gallon steam jacketed kettle made of* ENDURO *by Lee Metal Products Company, Inc., Philipsburg, Pa.*

In oval: *Eighteen 500-gallon milk tanks made of* ENDURO *by Lee Metal Products Company, Inc., Philipsburg, Pa.*

At right: *Laundry truck tub made of* ENDURO *by Ellis Drier Co., Chicago, Ill.*

**ENDURO**
REPUBLIC'S PERFECTED STAINLESS AND HEAT-RESISTING STEELS

*Licensed under Chemical Foundation Patents Nos. 1316817 and 1339378.*

CENTRAL ALLOY DIVISION . . MASSILLON, OHIO
**REPUBLIC STEEL CORPORATION**
GENERAL OFFICES YOUNGSTOWN, OHIO

# Making the Most *of* METHODS AND MATERIALS

## Steps in Manufacture of Coil Springs for Autos

COIL springs for the new type of front wheel suspension are manufactured in general according to the following steps: Round rod of proper analysis is rolled to close tolerance as to size and roundness; it is cut to length and each piece passed through a centerless grinder to remove scale, decarburized surface and skin defects. Next the bar may be planished to iron out grinder scatches. After tapering the ends, the bar is heated to a minimum working temperature of about 1750 degrees Fahr., coiled and transferred hot from the mandrel to a through furnace where the heat is equalized and gradually brought to the proper quenching temperature. Quenching is done in an oil spray in a fixture under compression. The hardened spring passes through a drawing furnace, from which it may or may not be quenched. Lastly the coil ends are ground for flat bearing. All heating is done under such atmosphere conditions that the expensively prepared surface will be scaled as little as possible and not decarburized. What oxide does form is removed with a wire brush, and the springs inspected for surface condition and hardness. If the springs are not housed, they are primed and japanned.

$ $ $

*In making its tail lamps of stainless steel, one automobile manufacturer finds annealing during fabrication is necessary. After the shell is drawn, two holes must be opened and flanged, one parallel to the axis and the other at an angle. The first mentioned hole offers no particular problem, but the other at an angle cannot be made without at least a local annealing. This is done with a blowpipe which softens the steel for an area of about ½-inch around the hole.*

$ $ $

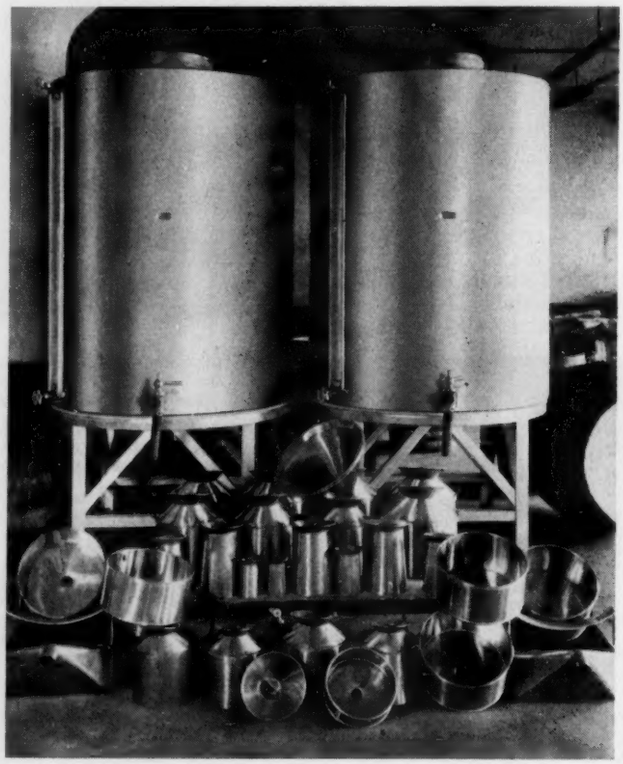
## Electric Truck Facilitates Storage of Strip Coils

AN EASTERN metal working company uses large quantities of strip steel, 6 to 8 inches wide, delivered to its yard in carload lots. As it arrives in the freight cars, the coils stand with their axes horizontal; the company stores them with axes vertical. The problem, therefore, was to change the position of the coils quickly and economically, using an electric storage battery truck. This problem was solved by constructing a unique tipping de-

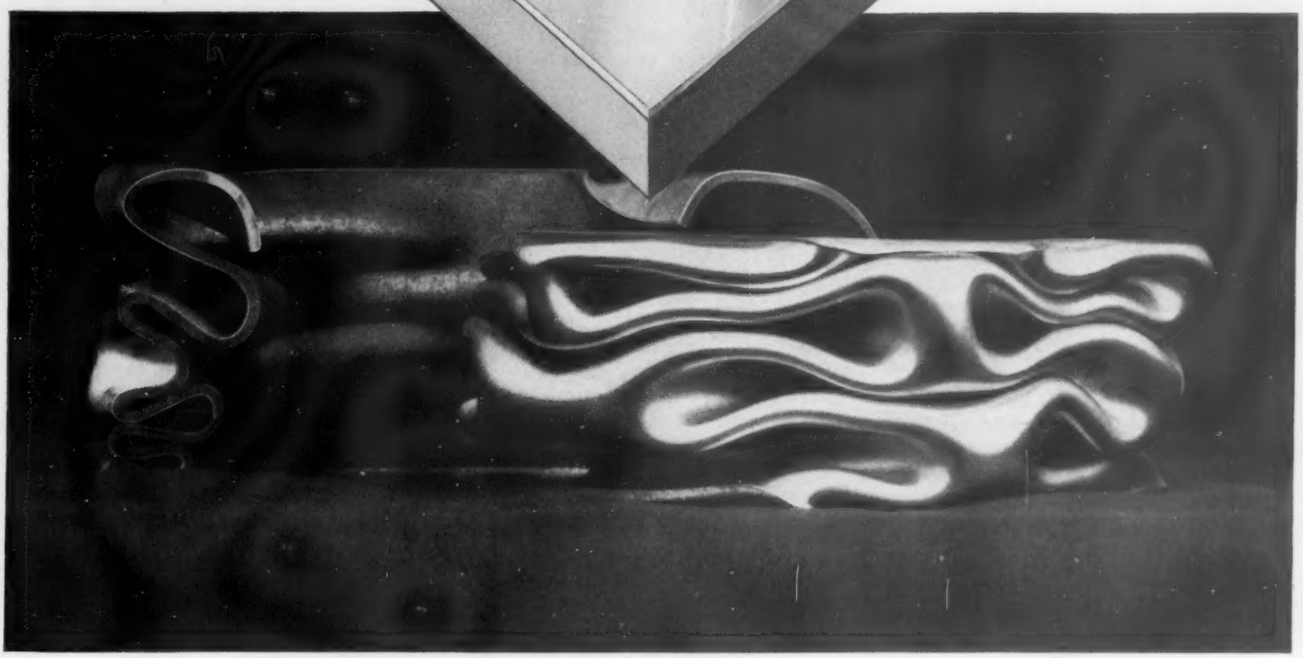
## Liquor Is Blended and Rectified In Stainless Steel Tanks

NEARLY 12,000 pounds of chrome-nickel stainless steel was required in fabricating tanks, equipment and utensils installed in the new liquor blending and rectifying plant of George Benz Sons Inc., St. Paul. This steel was supplied by the Republic Steel Corp., Central Alloy division, Massillon, O. The installation included 22 blending, storage, bottling and dump tanks with a total capacity of 13,800 gallons; bottling table; and miscellaneous utensils such as funnels, dump pans, drip pans, whiskey dumps and measures. Two of the 500-gallon capacity tanks and some of the utensils are shown in the accompanying illustration. The equipment was fabricated by Farwell, Ozmun, Kirk & Co., St. Paul; Reliance Engineers Inc., of the same city, engineered the job.

Stainless steel does not affect color, taste or clarity of liquor and beer, and is itself unaffected by contact with alcoholic beverages. This characteristic of 18-8 has resulted in its widespread use for brewing and distilling machinery, and dispensing equipment. Material made by the Republic company was used recently to build one of the largest beer cooling tanks ever constructed in the South.



# Here's a Stainless Clad Plate that will take Punishment



*Notice there is no separation of the stainless steel veneer from the backing plate in either inside or outside bends. You can work Plykrome without danger of fault or defect.*

Plykrome is unique in its resistance to splitting or separation of the stainless steel veneer from the base plate. It may be worked as you would work an ordinary carbon steel. It may be welded without subsequent heat treatment.

This outstanding superiority of Plykrome is due to the use of a special metallic bond sheet between the stainless steel veneer and the base plate. The two metals are effectively bonded by an intermediary alloy formed by the bond sheet. Plykrome is the only stainless clad plate embodying this important principle of fabrication.

For many applications where corrosion resistance is required only on one side, Plykrome is practical, workable, and economical.

For detailed information on the application of Plykrome to corrosion resistance problems, consult our representatives.

USS

## Illinois Steel Company

208 S. LA SALLE STREET, CHICAGO, ILLINOIS

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

# PLYKROME

U S S CHROMIUM-NICKEL ALLOY STEELS ARE PRODUCED UNDER LICENSES OF THE CHEMICAL FOUNDATION, INC., NEW YORK, AND FRIED. KRUPP A. G. OF GERMANY

vice. The truck, equipped with an elevating fork, enters the car and picks up as many as six coils, each weighing approximately 500 pounds. These coils are deposited on the tipping device which consists of an L-shaped cradle pivoted at the intersection of the two sides. The truck backs away, lowers its fork, advances and engages the fork under the horizontal side of the tipper. By elevating the fork, the cradle is tipped so that the coils rest one upon the other. The truck then moves around to opposite side of the tipper, picks up the coils and carries them to the storage department.

## Acquires Manufacturing and Sales Rights to Locknut

Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y., has acquired from the American Marsden Co., Jersey City, N. J., the sole manufacturing and sales rights in the United States of the Marsden locknut. A Marsden locknut division has been created at Port Chester for the development of the business. C. E. S. Place, formerly chief engineer of the Marsden company, now is associated with Russell, Burdsall & Ward in this connection.

**Locking Action Explained**

The locknut is identical in dimensions and tapping with a standard nut, but embodies a slotted head and an outer continuous bearing surface on its base. When the nut is tightened the outer bearing surface carries the thread-thrust load so that the segments, formed in the head through slotting, are thrown slightly inward and downward until a definite frictional contact on both sides of each thread of nut and bolt is formed. The nut maintains this "mechanically sprung" position under all conditions of vibration. When the nut is released by a wrench, the segments move outward to their normal position, as under the Marsden method of locking no deformation in the metal structure takes place.

The locknut is procurable in ferrous and nonferrous metals, to specially dimensioned designs and in sizes ranging from machine screw upward. Its use on 9-inch rudder pintle pins of transatlantic steamships is indicative of its application for heavy work. It also is used extensively in automotive work; on track work, rolling stock, power and signal appliances on railroads; in radios, switchgear, motors, etc. in the electrical field; and in many types of machinery. It is approved and being used by the navy department.

Pyrometer wells and other iron and steel products sometimes are sprayed with aluminum to resist high temperatures without scaling.

# Air Heater and Conditioner Shows High Efficiency

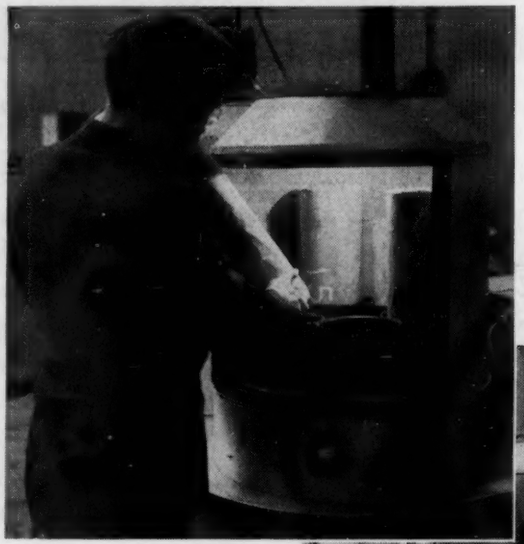
A NEW type of domestic heating and air conditioning unit developed in Middletown, O., during the past year and operating on the blast furnace principle, presents interesting possibilities in the air conditioning field and at the same time provides a promising use for iron, steel and heat-resisting alloys. An experimental model, designed by J. R. Edwards and Urban C. Thies, was demonstrated recently in the offices of the American Rolling Mill Co., Middletown, O., this company having supplied some of the materials of construction.

This unit, claimed to operate at an efficiency as high as 94 per cent, will burn either coal or gas. It otains this efficiency by maximum conversion of the heat units in the fuel and retaining this heat until it has served its purpose. It burns its own gases and preheats all air entering the combustion chamber so as to provide a temperature of 2200 degrees Fahr. in the fire pot. When exhausted to the stack, the gas has a temperature of only 115 degrees.

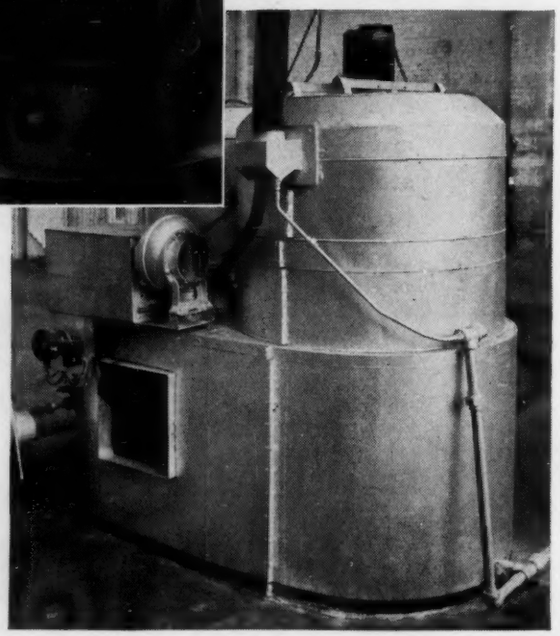
Coal, pulverized and compressed into sticks, 20 inches long and 6 inches in diameter, is placed in a magazine containing six chambers, which operates automatically on the principle of a revolver cylinder. These sticks feed down into the fire pot and burn under forced draft in the lower part of the pot. As one is consumed, an electrical contact is made, causing the interior of the chamber to revolve until the next stick moves over the opening in the combustion chamber. A full charge of fuel lasts from 24 to 48 hours.

A motor-driven combustion blower circulates air in a preheat chamber, surrounding the fire pot, heating it to 600-800 degrees Fahr. This air then is admitted to the burning fuel through small diagonal holes, thus starting a circular motion of flame around the coal stick.

Volatile gases, released from the upper part of the stick, are drawn



*COAL, pulverized and compressed into sticks and wrapped in paper, is placed in the magazines of this air heating and conditioning unit, as shown at the left. One filling of seven sticks lasts from 24 to 48 hours*



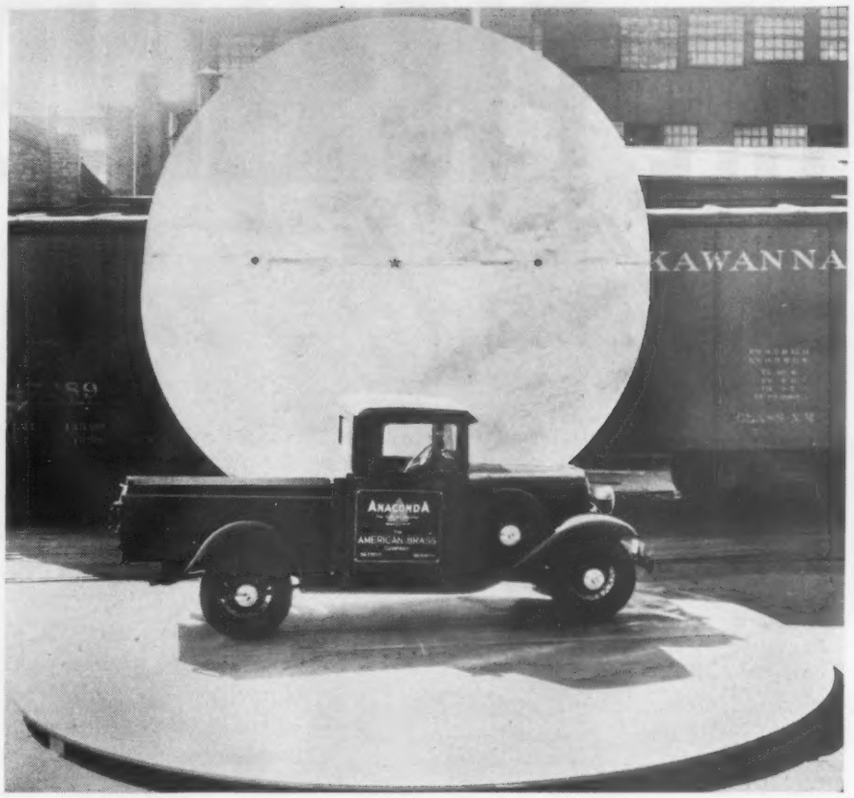
*AN EFFICIENCY of about 94 per cent is claimed for this unit, an overall view of which is shown at the right. Although combustion chamber temperature is around 2200 degrees Fahr., stack temperature averages only 115 degrees. For its construction, the unit requires about 1000 pounds of sheet steel, 125 pounds of gray iron and 35 pounds of heat-resisting alloy*

off the top through a large venturi tube and directed up through the grate and the sphere of combustion, thereby allowing few heat producing units to escape. A reduction gear on the motor agitates the grate to keep it clear of ashes and clinkers.

As the heat of combustion develops, it flows out of a throat situated about half way up the fire bowl and passes into the heat exchanger. This unit is similar to two large funnels telescoped into each other inside of a drum. On the outside of the funnel arrangement the downflow of house air rapidly acquires heat from the funnel walls heated by the rising gases inside and passes on around the hot burning chamber to be directed back to the rooms.

The Conditionedaire, as it is called by its developers, is said to operate just as efficiently when using gas as fuel. A stopper is put on top of the coal burner and raw gas is mixed with a large volume of preheated air in the combustion chamber. Succeeding operations follow those described previously. Air in the house can be changed twice an hour by the blower and is cleansed and humidified with each operation by a small jet of heated water sprayed into the hot air flow. The unit is adapted to cool and de-humidify the air in the summer by cooling the large metal surfaces of the heat exchanger with water or mechanical refrigeration.

In fabricating the experimental model, about 1000 pounds of ingot iron sheet was required. Galvanized sheets compose the upper part of the heating chamber to protect it from corrosive gases. The upper part of the fire bowl, weighing about 125 pounds, is cast iron, and the lower part and grate are of a high heat-resisting alloy.



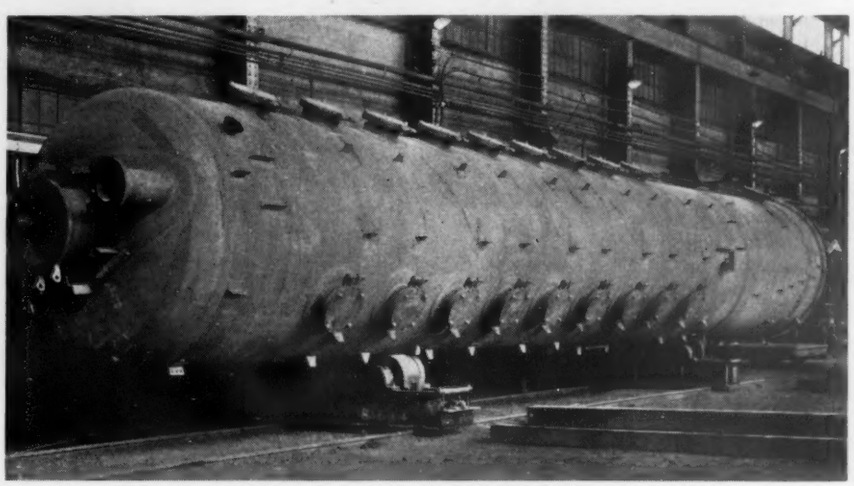

*Four Muntz metal condenser headplates in half ovals. Each piece is 126 inches wide, 236 inches long and 1¼ inches thick. Total weight of the four is 37,532 pounds*

## Condenser Headplates of Record Size

WESTINGHOUSE ELECTRIC & MFG. CO. is engaged in building a surface condenser which will contain 113,000 square feet of tube surface within a single shell. The condenser sets a record for size, and the fabrication of its various parts has required manufacturing accomplishments on a scale never before attempted.

The Muntz metal headplates for this condenser are the largest ever produced. Each plate is in two segments. Each segment weighs 9300 pounds, is 1¼ inches thick, 236 inches wide, with a radius of 126 inches. When assembled on the condenser, the headplates will be oval.

The segments were fabricated in the Detroit mill of the American Brass Co. on equipment designed to roll and machine the large circles and semicircles required for nonferrous head plates and for the copper forms used in the construction of brewing, distilling and similar equipment.



*FRACTIONATING TOWER BUILT BY ARC WELDING: This unusually large fractionating tower was fabricated recently by the Struthers-Wells Co., Warren, Pa., and shipped to Canada for oil refinery service in connection with the Dubbs cracking process. The unit is 58 feet high and 10 feet in diameter; the shell is ¾-inch thick and the heads ⅞-inch thick. It was completely arc welded using electrodes manufactured by the Lincoln Electric Co., Cleveland. Upon completion, the tower was heat treated in the manufacturer's large stress-relieving furnace*

## Aluminum Foil Reinforces Asbestos Insulation

An English company has succeeded in producing an asbestos reinforced aluminum foil to meet the requirement of a new method of insulation against heat. Instead of the customary method of providing an air space of an inch or more between sheets of plywood or asbestos, it has been demonstrated that if this space is divided by a thin partition covered on both

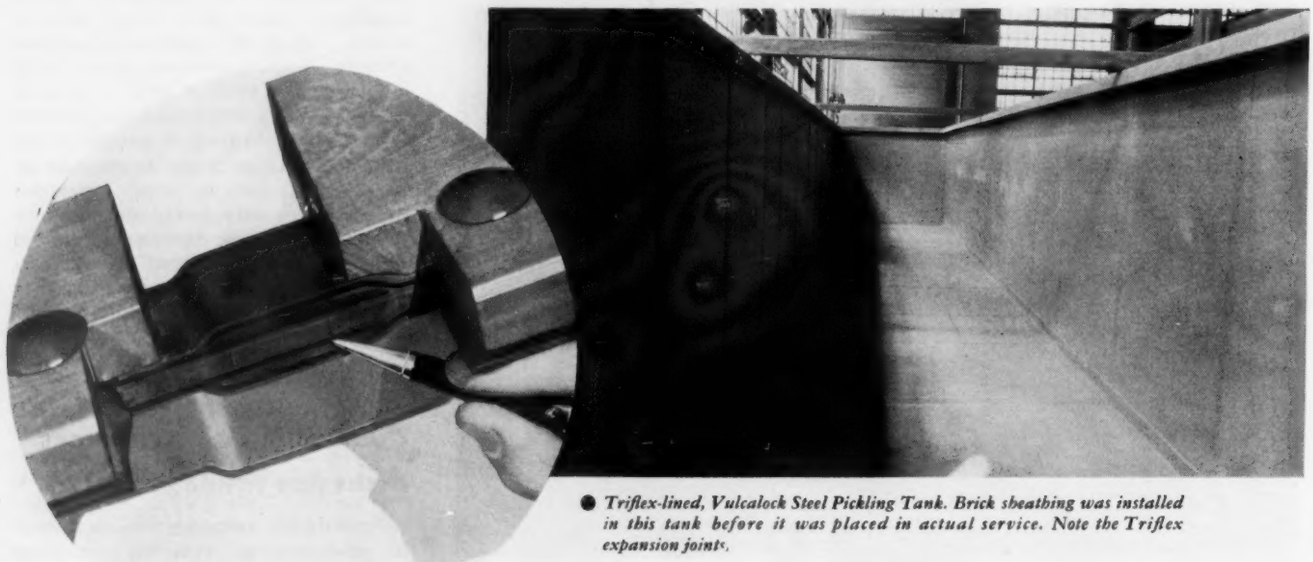
# THE PICKLING TANK *is already Triflex-lined*

WHEN Inland Steel Company engineers faced the problem of having a new strip pickling unit constructed, their thought was not confined to provision for immediate contingencies. They projected their planning into future years and set out to build *the pickling tank of tomorrow.*

Their new 240-foot unit is comprised of 4 tanks, each 60 feet in length, 7 feet wide and about 5 feet deep. No excavation was necessary since all tanks rest on concrete piers at floor level. Equipped with sumps in the end for proper drainage, the tanks are emptied by 6-inch lead siphons operated with cold water. When a tank is covered and ventilated, one may stand right beside it, never realizing that pickling is in progress, never inhaling unhealthful fumes. In providing pickling facilities, Inland Steel Company engineers scientifically surveyed the issues of capital expenditure, operating expense, maintenance expense and working conditions. And just as scientifically did Goodrich meet every issue.

Goodrich is proud of Inland's pickling tank of tomorrow. For the entire unit *is in service today,* lined with ¼-inch Goodrich Triflex Rubber and sheathed with 8-inch brick laid up with Vitrobond. Ventilation is preserved through the use of rubber-lined pipe and rubber-lined fans. On every feature involving rubber lining, Goodrich engineers worked hand in hand with Inland officials.

Goodrich participation in this instance is typical of the service offered by a staff of Goodrich Research Engineers. They stand ready to work out for you those pickling problems of leakage, corrosion, abrasion, replacements and high maintenance expense. Let them explain—



● *Triflex-lined, Vulcalock Steel Pickling Tank. Brick sheathing was installed in this tank before it was placed in actual service. Note the Triflex expansion joints.*

**Goodrich**

# OF TOMORROW • • •

● *The new strip pickling unit of the Inland Steel Co., Indiana Harbor, Ind.*

1) How Triflex, with its layer of hard rubber sandwiched between two layers of soft rubber resists corrosion and abrasion.

2) How Triflex, applied by the exclusive Goodrich Vulcalock Process, insures adhesion of 700 to 1000 pounds per square inch between rubber and steel.

3) How Triflex expansion joints, properly spaced in the rubber lining, prevent buckling and cracking under extremes of temperatures.

4) How brick sheathing, laid up with a special mortar, may be combined with Triflex,to give greater insulation in high temperatures and added protection against gouging. And how expansion joints, applied in the brick itself, give permanence to the whole installation.

Whatever your peculiar problems may be, Goodrich engineers will be glad to analyze them with you and to make specific recommendations. Complete designing and installation service is provided at no extra cost. The B. F. Goodrich Rubber Company, Mechanical Rubber Goods Division, Akron, Ohio.

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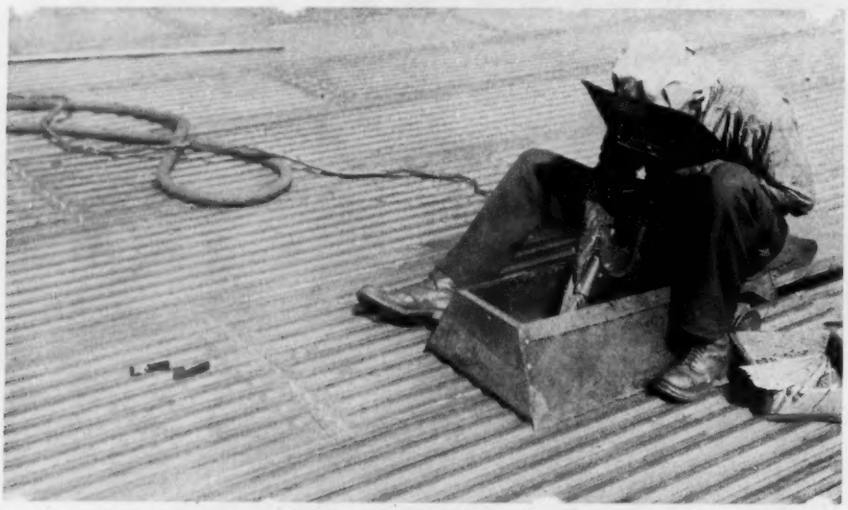
sides with aluminum foil, the shiny surface reflects the heat back on one side and radiates less on the other, so that the insulation is far more effective. The foil remains shiny and does not tarnish on long exposure to the atmosphere. Sheets of asbestos reinforced aluminum foil have been exposed for three months in all weathers and partly underground without showing signs of deterioration.



# Corrosion-Resisting Corrugated Sheet Roof Fabricated by Arc Welding

TO MEET special conditions of service, a corrugated metal roof, with joints between the sheets electrically welded, was installed recently at the plant of the Republic Carbon Co., Niagara Falls, N. Y., The method of construction, shown clearly in the above illustration, was developed by S. M. McAnulty, plant engineer of the company.

The roof covers a calcining plant which consists of a number of large iron cylinders in which coal and petroleum coke are reduced to graphite by heating. These pots are cooled by water spray, resulting in hot fumes and gases being given off at the top. Since there is a considerable amount of steam in the building, the formation of sulphuric acid from the sulphurous gases in the air required a roof which resists the attack of acid. Low-phosphorus, copper-bearing sheets, known as Toncan iron and manufactured by the Republic Steel Corp., Youngstown, O., was selected because of this material's resistance to corrosion and acid attack.

About 35,000 pounds of 12-gage, hot-rolled, annealed, pickled and corrugated sheets were required for the job and were supplied by Beals, McCarthy & Rogers Inc., distributors, Buffalo. The sheets were arc welded together with heavy flux-coated Toncan iron welding rod and after welding were coated on the inside with Elasticote and on the top with an aluminum-asphalt paint. Overlapping expansion joints were placed at intervals of 28 feet, the space between the lapping and along the exposed edges was covered with glazing cement.

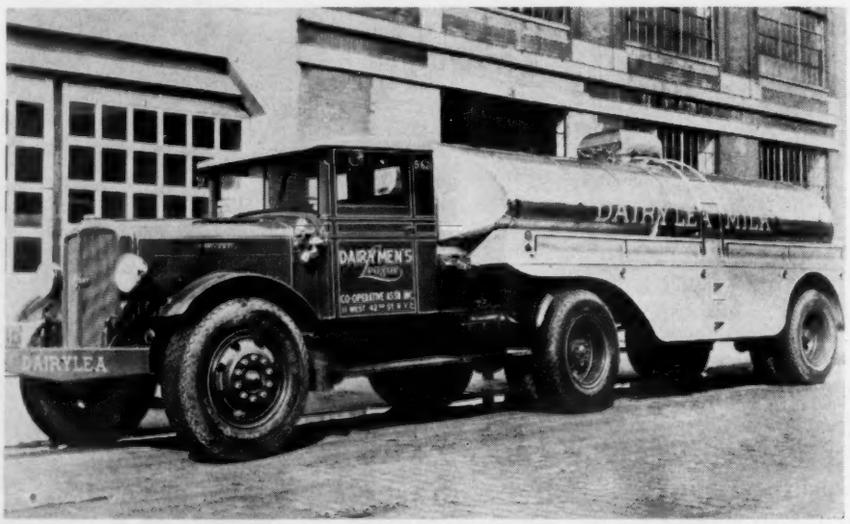
An all-metal welded roof of this type presents no crevices under which wind can secure sufficient leverage to rip off the sheets. Likewise, water cannot be driven by the wind between the sheets, resulting in a completely weather-proof job. It is said that the cost of a roof of this kind compares favorably with the cost of other forms of construction.

## Trimming Dies Hardfaced To Extend Service Life

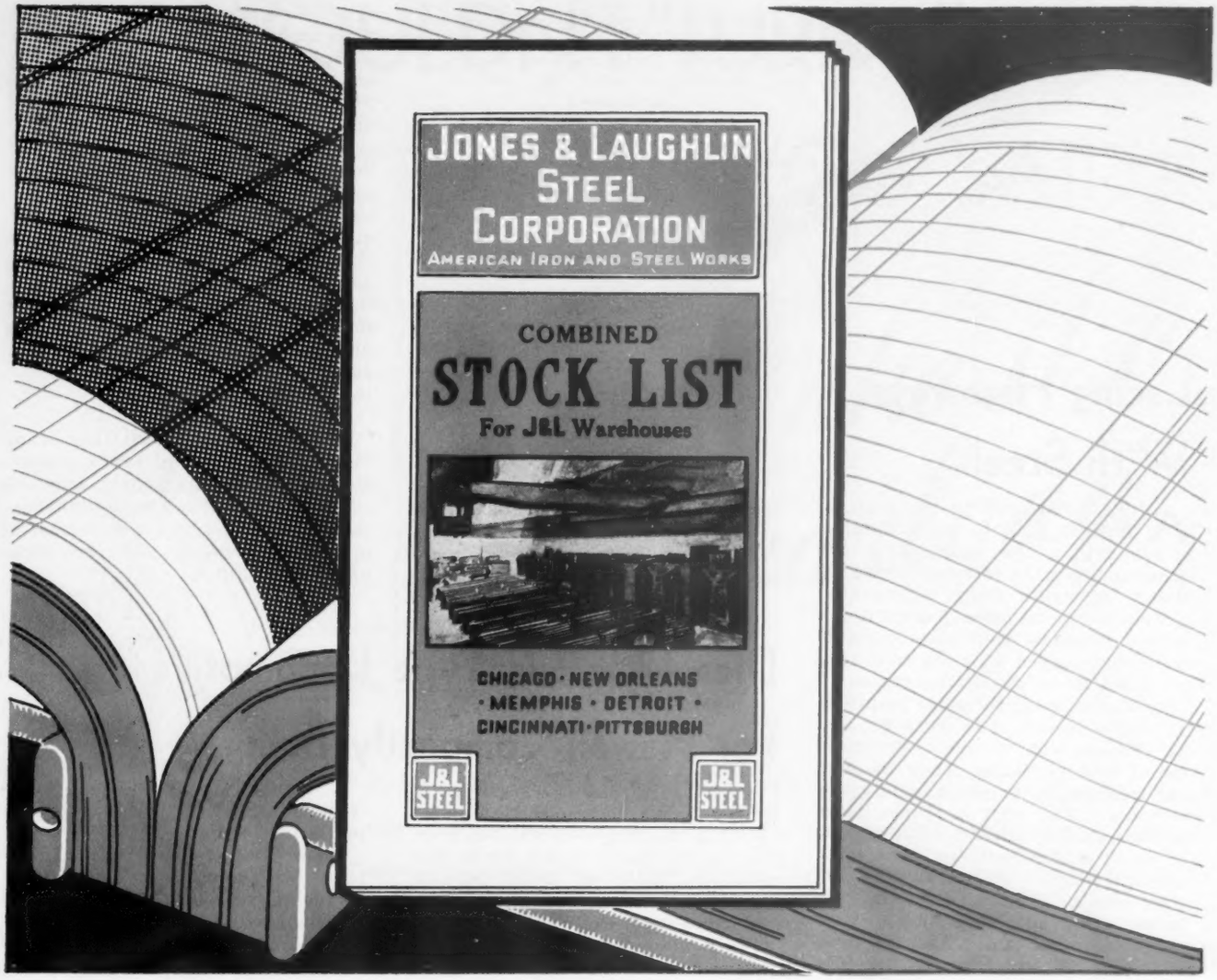
Operation of hot trimming the flash from automobile hub forgings with dies and punches hard faced with stellite has proved so successful in a midwestern plant that the company has standardized on this practice. In a test run, an old and wornout die and punch were hard faced and put back into service. This set trimmed 10,000 forgings as compared with an average of 2000 with the regular steel die and punch. The stellite was applied with the blowpipe, about 2 pounds of welding rod being required to face the working edges.

## Enameled Steel Tested for Thermal Qualities

A report of the preliminary investigation of thermal properties of porcelain enameled steel is published in the February issue of *The Enamelist*. The tests reported were of such a sort as to find out, by comparison with insulite or celotex, whether the insulating value of porcelain enameled sheet steel was sufficient to warrant further study. Enameled sheets were found to be about half as good as ½-inch of insulite as far as protection from radiant heat was concerned.




*MILK CARRIED INTO NEW YORK IN STAINLESS STEEL TRUCK TANKS: Shown is one of two 3000-gallon truck tanks placed in service recently by the Dairymen's League Co-operative association. These tanks, among the largest of their kind, were built by the York Ice Machinery Corp. in its Canton, O., plant These trucks, units in a fleet of 60, transport raw milk from outlying receiving stations 150 to 200 miles to the central bottling plant in metropolitan New York. The two tanks, fabricated by welding from 10-gage 18-8 chrome-nickel steel, are insulated with 2-inch corkboard and an outer casing of aluminum ⅛-inch thick with natural finish. Around the tanks are walkways of diamond-tread steel plate; all mountings likewise are of steel construction*

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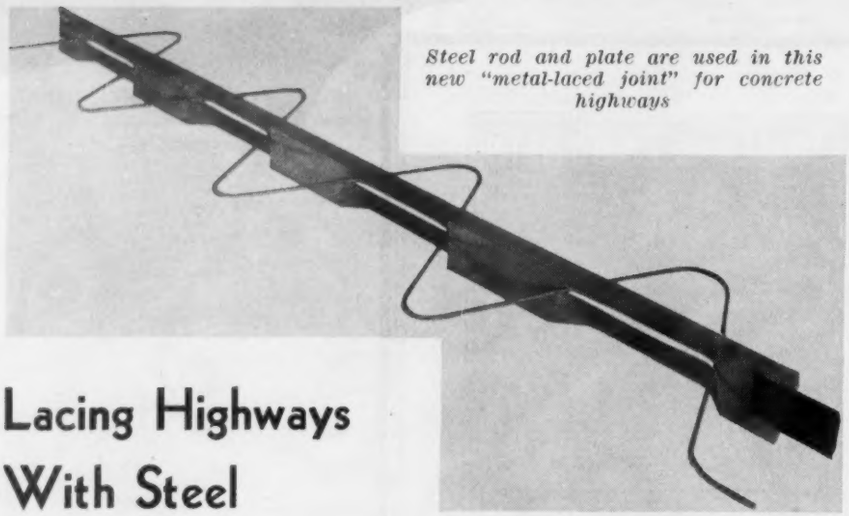


*Steel rod and plate are used in this new "metal-laced joint" for concrete highways*

# Lacing Highways With Steel

AN INNOVATION in the application of steel to road building is found in a new closed joint for concrete highways just announced by the A. O. Smith Corp., Milwaukee. Named a "metal-laced joint," it involves a vertical steel plate through which is threaded a zig-zag steel rod, as shown in the above illustration.

No stakes or supports are required. The plate is shaped so as to provide an efficient slab interlock, or transfer of load vertically, while the zig-zag rod serves to "lace" the slabs together. The joint is proportioned mathematically to use every pound of metal most effectively. The joint also furnishes a desirable steel reinforcement of the slabs for 10 inches along adjoining sides.

"Metal-laced joint" has few and simple parts, which are easily and quickly assembled and handled. It is produced in standard 10-foot lengths; designs for both longitudinal and transverse joints are available. A variety of rod diameters, plate widths and gages are offered, thus providing various combinations to meet different requirements.

## Dry Ice Used To Shrink-in Valve Seat Inserts

Many automobile, industrial and marine engines are fitted with rings of a hard, tough cast alloy which serve as seats for the exhaust valves. This construction reduces valve seat wear, improves compression and conserves gasoline and oil. Several months ago, one automobile manufacturer undertook to shrink the valve seat rings in dry ice refrigerators and to insert them while they were contracted. The method proved so successful that it has been adopted as standard practice. The rings are shrunk about 0.0025-inch and are then from 0.001 to 0.0015-inch larger in diameter than the recessed holes into which they are fitted. They are driven into the holes with two light hammer blows. When the rings expand to their normal diameter at room temperature, they press so firmly against the recessed walls that peening or any other means of holding them in place is unnecessary. The dry ice method of seating the rings entirely eliminates distortion of cylinder blocks.

Because it is essential that enamel frit be kept free of rust discoloration and all foreign matter, bins and utensils with which it comes into contact in the enameling department of a large midwestern plant are made of monel metal.

## Nickel Cast Iron Dies Used

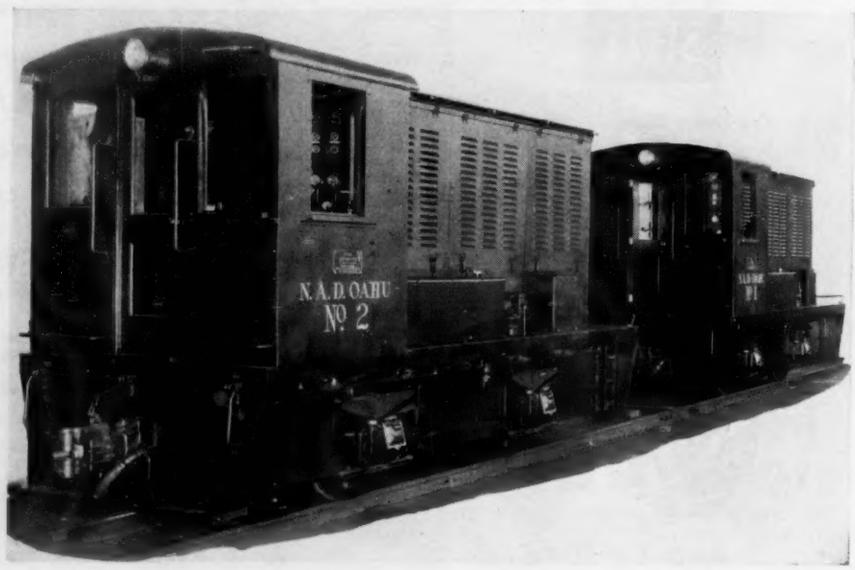
*A manufacturer of pressed steel snow shovels has reduced the unit cost of his product by using cast iron dies containing 3.00 per cent nickel and 0.70 per cent chromium. Such dies already have produced 820 dozen shovels with a single regrinding. Dies previously used required regrinding after 320 dozen shovels were made and produced only 210 dozen additional before it was necessary to scrap them.*

# Diesel-Electric Type Locomotives For Hawaii Compactly Built

TWO 35-ton diesel-electric locomotives recently were shipped from the United States to the Naval Ammunition depot at Oahu, Hawaii. These locomotives, built by the Atlas Car & Mfg. Co., Cleveland, have 38-inch diameter steel tired wheels and each has two 140-horsepower electric motors, one to each driving axle. The engines are 4-cylinder, solid injection, diesel units of 265 brake horsepower, furnished by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. They are direct connected to generators which furnish current for the main propulsion motors. Rating of the locomotives is high, being 7.5 horsepower per ton.

Since these locomotives had to be built for narrow-gage operations—36 inches, they had to be constructed compactly to meet the width, length and height limitations set by the navy. This necessitated most careful designing in arranging the apparatus in the space allowed and in permitting easy access. The illustration indicates the accessibility and compactness.

Units of this type, according to the manufacturer, lend themselves nicely to industrial use, particularly in interplant haulage.



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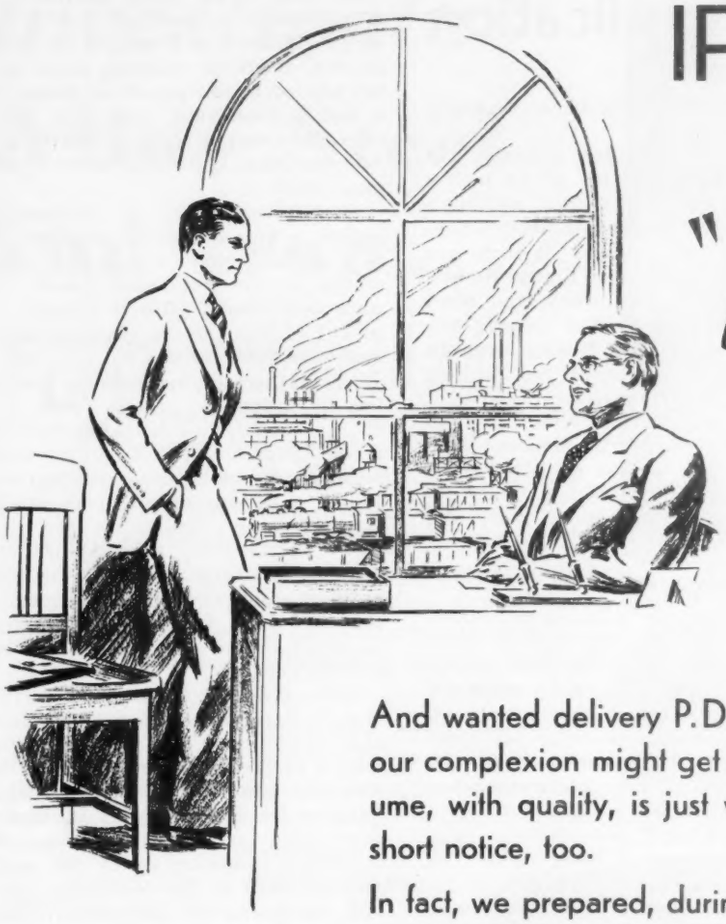

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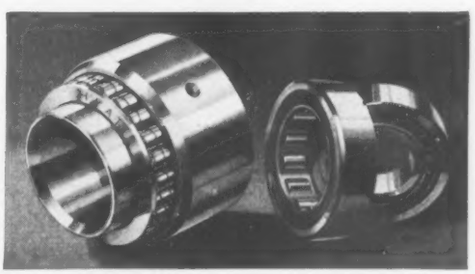

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## ROLLER BEARINGS

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# Panels of Metal Bonded to Wood Find Wide Application

WHILE steel has supplanted wood to a large degree in the manufacture of many products, the use of a combination of these two materials has been found desirable in instances where light weight, strength and stiffness are important considerations. Such a combination is available in sheet form in which the component layers of wood and metal are securely bonded together.

One such material is Met-L-Wood, manufactured by the Met-L-Wood Corp., Chicago, and used successfully for a number of years in a variety of applications, the principal one being for the building of motor truck bodies. One of its latest adaptations was in the construction of the body of the "Railcarbus" built by the Kalamazoo Railway Supply Co., Kalamazoo, Mich., for operation on the Hillsboro & North Eastern railroad in Wisconsin. The railway vehicle was illustrated and described briefly on Page 12 of the Feb. 12 issue of STEEL.

**Assembled Under Pressure**

Met-L-Wood consists of a three-ply section of yellow poplar, sheathed with metal, usually steel, on one side or both. Between the steel and the wood is a cotton fabric bond, and the three separate materials are held compactly together by a waterproof glue. The fabric bond is introduced to compensate for the unevenness in expansion and contraction between wood and steel, and, in addition, gives increased strength to the entire section. Component parts are assembled under pressure in large presses and after the glue is permitted to dry for 24 to 48 hours, the sheet is ready for use.

Panels of the plied material are made in sizes as wide as 72 inches and as long as 24 feet, although longer pieces can be furnished. While thicknesses of ¼ and ⅜-inch are standard, others also are available. As previously mentioned, the steel backing may be applied to only one side or to both sides. Tensile strength of the latter material for ⅜-inch thickness and 27-gage steel is around 5000 pounds per square inch and the compressive strength about 6000 pounds. The weight ranges from 3 to 3.5 pounds per square foot, depending on the gage of steel and total thickness.

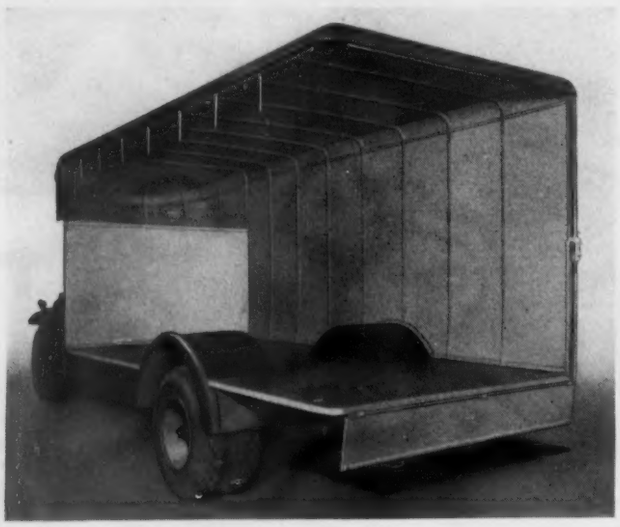
**Strength with Less Bulk**

Several factors have been responsible for the extensive use of these panels during the past five to six years in motor truck body construction. Stronger and stiffer than an equivalent section of wood yet lighter than a steel member of equal size, the composite material approaches closer to the desired characteristics of strength, weight and stiffness than does either wood or steel alone. Its relatively thin section does not require bulky supporting members, thereby increasing the volume of carrying capacity.

The accompanying illustration shows the design of truck bodies using the composite material. This type of construction generally applies for bodies more than 120 inches long, about 54 inches high and 58 inches wide, outside measurements. This design is identical with that employed in the building of the Railcarbus. On smaller truck installations all the framework on the inside of the panels is eliminated, the panels carrying the full load imposed upon them by the roof. For larger units carlines are introduced as supporting ribs to the walls. These are U-shaped in cross section, made of 16-gage steel, and are affixed to the panels by means of a specially-designed split rivet made of copper-coated steel. Panels are ⅜-inch thick, with two faces of 27-gage steel.

In affixing angles or carlines to panels, a firm support is provided on the opposite side of the piece into which the rivet is being driven. An unusually strong joint is effected by means of these rivets, years of motor truck service failing to disclose a single failure or appreciable loosening of individual rivets. Side and roof assemblies of truck bodies are made separately. Side carlines, welded to floor plate angles, are joined with similar members of the roof assembly just below the roof rail. Splice pins, welded into the roof carline, register with the side carlines, and rivets driven through the roof rails and splice pins after assembly of the two sections provide a solid joint.

Many different applications of this material are suggested by its unique characteristics. Used for table tops with a thicker wood section than the standard size, the sound deadening effect of the wood offers an advantage over solid steel construction. In decorative paneling work the stiffness afforded by the composite material frequently is desirable. While steel ordinarily is used in the manufacture of this product, the wood also may be bonded to aluminum, lead, copper, zinc and similar metals. Galvanealed steel, furnished by the Republic Steel Corp., Youngstown, O., commonly is employed.



*TRUCK body constructed from metal-wood panels. The panels are made by bonding two faces of 27-gage steel to a ⅜-inch thickness of wood. Supporting ribs are U-shaped sections of 16-gage steel; panels are fastened to them by copper-coated split steel rivets*

## Forgings Cleaned by Acid And Abrasion Actions

Descaling forgings by tumbling in weak acid is discussed by N. Ransohoff of Cincinnati, O., in the March issue of *Metal Progress*. While current research has demonstrated that atmospheric control of all heating operations will mitigate scale, the problem of cleaning oxidized surfaces usually remains.

In this article the author describes some recently developed equipment for scale removal in which the forgings are charged with hardened stainless steel stars in a cold pickle solution (2 per cent acid). The work then is screened from the tumbling material and conveyed to a washing drum where tumbling sludge is removed by a hot basic cleaning compound neutralizing all acid remaning on the work.

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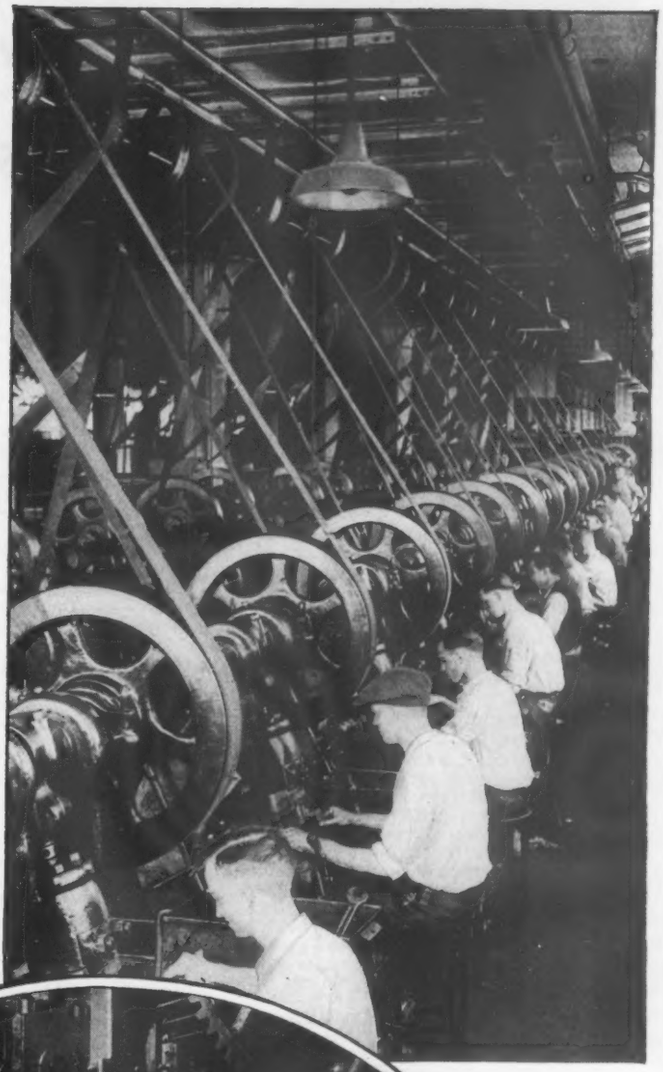

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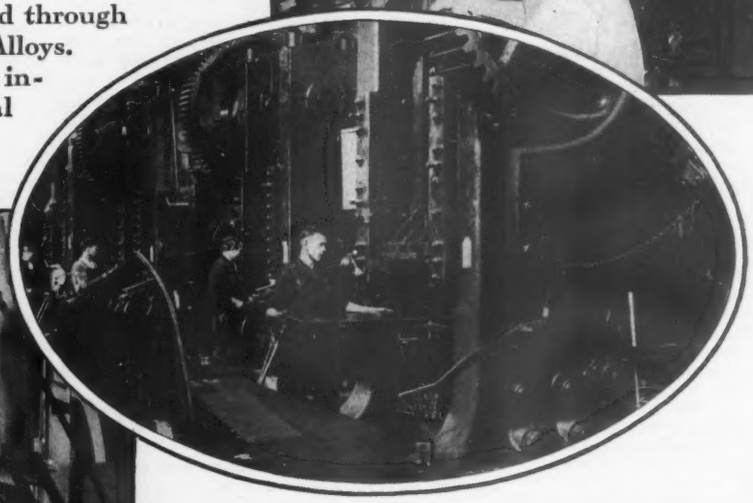

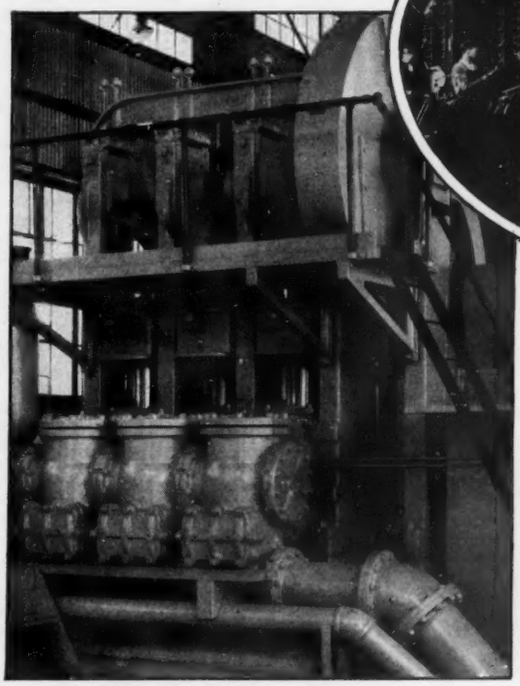

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# Report Progress in Revision Of Material Standards

ONE of the most important technical association meetings held each year is the spring group meeting of committees of the American Society for Testing Materials. This assemblage convened this year in Washington, March 5-9. Over 150 separate meetings were scheduled—main committees, sections and subcommittees participating.

Revisions in existing standards and tentative standards, review of current research and recommendations for new specifications and test methods featured the work of these committees. Of interest to readers of STEEL are the following summaries of a few of the committee meetings.

Committee A-1 on steel:

Reported that it appeared necessary to retain the three present grades of rivet steel—for boilers, 45,000-55,000 pounds per square inch tensile range; for bridges, buildings and rolling stock, 52,000-62,000; for ships, 55,000-65,000.

Revised rivet specifications for maximum sulphur content from 0.045 to 0.05 per cent, thus simplifying purchase of various grades of steel involved at no sacrifice of any necessary safeguards.

Recommended that standard specifications for open-hearth carbon steel rails be revised into closer conformity with specifications which a number of the railroads are using.

Recommended adoption as standard of existing tentative specifications covering steel for bridges (A7-33T), steel for buildings (A9-33T), and mild steel plates (A10-33T); and the current withdrawal of the existing standard specifications for structural steel for bridges (A7-33) and for structural steel for buildings (A9-33).

Recommended that standard specifications for structural steel for ships no longer require a tension test to be made on sheets 3/16-inch and under in thickness.

Recommended and approved tentative revision in reinforcing bar specifications to tighten up permissible weight variations to provide tolerances on individual bars of 6 per cent under for bars ⅜-inch and over; 10 per cent under for bars less than ⅜-inch diameter.

Recommended through forgings subgroup a number of changes in standard specifications for carbon steel car and tender axles. Further, the question of ining carbon, manganese and vanadium requirements in tentative specifications for normalized and tempered alloy steel forgings for locomotives was discussed and referred to subgroup on alloy forgings.

Recommended revisions of the standard specifications for wrought solid carbon steel wheels for electric railway service to reduce the tolerances for flange of the wheel to one-half those now in existence, while manganese and silicon ranges will be raised.

Reviewed work on revisions of tentative specifications for black and hot-dipped zinc-coated seamless steel pipe. Four of the specifications covering fabricated pipe, including electric resistance welded, forge welded, lock-bar and riveted steel pipe, are to be submitted to letter ballot of all committee members for recommended adoption as standard. Further, a change in the electric fusion welded steel pipe specifications was proposed, to read as follows: "The weld metal shall not project more than 50 per cent of the wall thickness for pipe 3/16-inch or under in thickness; not over 30 per cent for pipe over 3/16-inch up to and including ¾-inch; and not over 25 per cent for walls over ⅜-inch."

Announced plans for consolidation of two specifications covering high-tensile carbon steel plates; also for consolidation of specifications for boiler and firebox steel for stationary service, and for steel plates of flange and firebox quality for forge welding.

Took action to recommend the withdrawal of tentative specifications for electric cast steel stud-link anchor chain, no longer needed.

Announced proposed revisions in tentative specifications for cold-rolled strip steel, including amplification of table of physical properties and discontinuance of the latter basis for acceptance or rejection.

Approved for submission to the society new specifications for electric fusion-welded steel pipe 18 inches and over in diameter for high-temperature and high-pressure service. Three grades of plate for use in making the pipe are given, minimum tensile strengths being 45,000, 50,000 and 55,000 pounds per square inch. Radiographic examinations of the pipe are required. Each length of pipe is to be tested to a hydrostatic pressure which represents a stress of 75 per cent of the minimum specified yield point. Other minor changes were included.

Pointed out that A. S. T. M. specifications covering a number of materials and products are a fundamental part of the iron and steel NRA code, and in many instances are the foundation for basic prices.

### Report on Iron Quality

Committee A-2 on wrought iron:

Announced completion of report on quality of wrought iron. In the report are included discussion of chemical and physical properties, structural characteristics, microscopic examination, and the like.

Considered change in manganese requirements in certain specifications.

Discussed consolidation of existing specifications for common iron bars and for refined wrought iron bars, to cover the materials in a single document for merchant bar iron.

Committee A-5 on corrosion of iron and steel:

Outlined extensive test program now under way in various sections of the country.

Reported through subcommittee on total immersion tests on additional failures of 16-gage sheets at Portsmonth, N. H., and Key West, Fla. Additional immersion tests on flat sheets at these points will be undertaken.

Reported through subcommittee on field tests of metallic coatings that additional inspections had been made of the corrosion test on galvanized sheets.

Committee A-10 on iron-chromium, iron-chromium-nickel and related alloys:

Reported good progress toward completing compilation of data covering chemical, physical, mechanical and fabricating properties of these alloys. These data also will include successful fields of application, marketed forms and other information on these materials.

Reported on examination and study of three accelerated corrosion tests—salt spray, boiling nitric acid and copper sulphate stain tests. Refinements in test methods are being considered, including a shortening of the time required for the boiling nitric acid test and a re-examination of the copper sulphate test to determine what effect surface finish may have on reproducibility of results and a study of the effect of adverse heat treatment on the copper sulphate stain test.

Announced preparation of paper on polishing and etching of iron-chromium and iron-chromium-nickel alloys for inclusion in annual report of the committee.

Reported progress in completion of specifications for sheets and castings.

Decided to organize separate specifications subcommittees on flat products, including sheets, strip and plates; on castings; and on wrought products exclusive of flat and tubular products, and possibly another subcommittee covering other forms.

Considered development of a round-table discussion for the next regional A. S. T. M. meeting on the subject of structural changes of the corrosion-resisting steels in fabrication and in use, and their influence on service.

### Cross Check Creep Tests

Joint A. S. T. M.-American Society of Mechanical Engineers research committee on effect of temperature on the properties of metals:

Announced plans for cross-checking of short-time high-temperature tensile tests and long-time or "creep" tests. Through courtesy of Bethlehem Steel Co. a supply of 0.40 per cent carbon open-hearth steel, specially made, selected, annealed and tested, is being made for the committee and will be furnished to those laboratories interested in finding out how well their short-time and/or creep tests agree with those from other laboratories. Such co-operating laboratories will agree to make the comparison creep tests at one temperature and load and for the length of time selected by the committee, and the short-time tests at a few selected temperatures, recording all data required by recently prepared "codes of recommended practice" in order to show that at least the minimum precautions for accuracy required by those codes have been observed. Sufficient material for duplicate tests will be supplied if desired. A. S. T. M. headquarters will furnish at nominal cost pads of forms for reporting data. Results will be summarized and when enough data are in, published, each laboratory being designated only by a symbol. It is expected that the degree of concordance shown by such a comparison will greatly increase the confidence of engineers in the determinations of high-temperature properties of metals made with modern equipment and using up-to-date precautions for accuracy.

Requested a list of laboratories equipped to make short and long-time high-temperature tests under code refinements and the number of creep units that are available in each laboratory. In this "census" it is desired to list both the private laboratories of firms handling only the work of those companies themselves and the research

(*Please turn to Page* 53)

ADVERTISING PAGES REMOVED

# PROGRESS IN STEELMAKING

METALLIC powder intended for making permanent tight joints in pipe lines, and for cylinder heads, boiler end doors and other purposes at blast furnaces and steel plants without further need for packing or gaskets, has been placed on the market. The material, which is mixed with boiled linseed oil into a stiff putty, remains soft so that the joints can be broken and the material removed in preparation for remaking the joint.

♦ ♦ ♦

Marble surfaced steel made by a laminated surface of resin woven inseparably with the metal has been developed. Any other finish employing the new laminated resins can be added. An alloy, such as zinc or tin, is the adhesive which fuses with both the steel and the coating. The new commodity can be used where most layers of fabric or paper are required.

♦ ♦ ♦

Economy in the maintenance of nail machines is afforded by coating the pad and adjusting screws of cut-off levers and double draft block rings with an abrasive-resisting material. Coating the pinch cams with a 1/16-inch layer of hard facing for two-thirds of their periphery affords 18 months of service compared with a service life of three months when untreated cams are used.

♦ ♦ ♦

Both magnesite and chrome brick, which will not shear under normal loads at temperatures up to 2900 degrees Fahr. are of recent development. A suitable bonding mortar for laying the new brick also has been perfected.

BETTER operating costs through better combustion and a reduction in the maintenance has been made possible at a large steelworks by the installation of a boiler equipped with a water-cooled furnace. Burners for combination firing of blast furnace gas and pulverized coal provide a new arrangement of firing. A feature of the installation is the manner in which the pulverized coal burners and gas burners are mounted in the same horizontal plane and arranged to fire between the water cooling tubes of the furnace. This arrangement results in better combustion conditions in the furnace when using any ratio of the two fuels. The unit was designed to deliver 300,000 pounds of steam per hour when using pulverized coal as fuel, or 200,000 pounds of steam per hour when fired with blast furnace gas. The steam pressure is 350 pounds per square inch.

♦ ♦ ♦

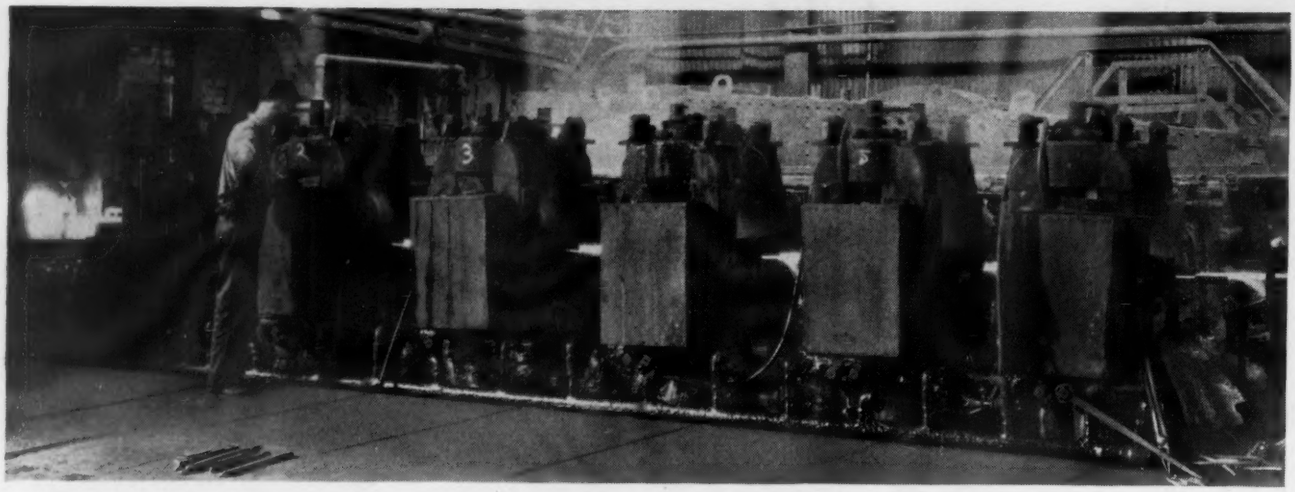
A nonintegrated strip steel mill in the Pittsburgh district recently was forced to use natural gas for its billet heating furnaces when the captive mine coal strike forced suspension of operations at its mine. A low-grade Freeport vein coal had been used, but since on trial of several months with natural gas as fuel it has been found that the billets are heated more uniformly as well as more economically.

♦ ♦ ♦

*Heat generated by the heavy reductions effected at high speeds by a 4-high mill in the Pittsburgh district for rolling strip steel to tin plate gages, is controlled by a recently developed system. The rolls may be heated before reduction starts or the heat may be dissipated, thus establishing and maintaining the proper pass contour.*

♦ ♦ ♦

Automatically measuring the length of sheets or black plate during the hot rolling process is the purpose of a new device which can be applied to existing installations of the conventional type or to any mill equipped with mechanical feeding and catching tables. When a sheet is free of the rolls, its length automatically is indicated by a pointer on an illuminated dial calibrated to read directly in inches. The pointer maintains its position while the sheet is returned to the roller's side and fed into the mill again, thus affording the operator ample time to read the length and adjust the rolls. During each successive pass the pointer moves from the previous position to a position conforming to the length of the sheet. When a new piece is fed into the mill the pointer automatically is reset to measure the initial length of the piece being rolled.



*Roughing stands in a modern continuous rod mill*

# PROGRESS IN MANUFACTURE AND USE OF WIRE AND WIRE PRODUCTS

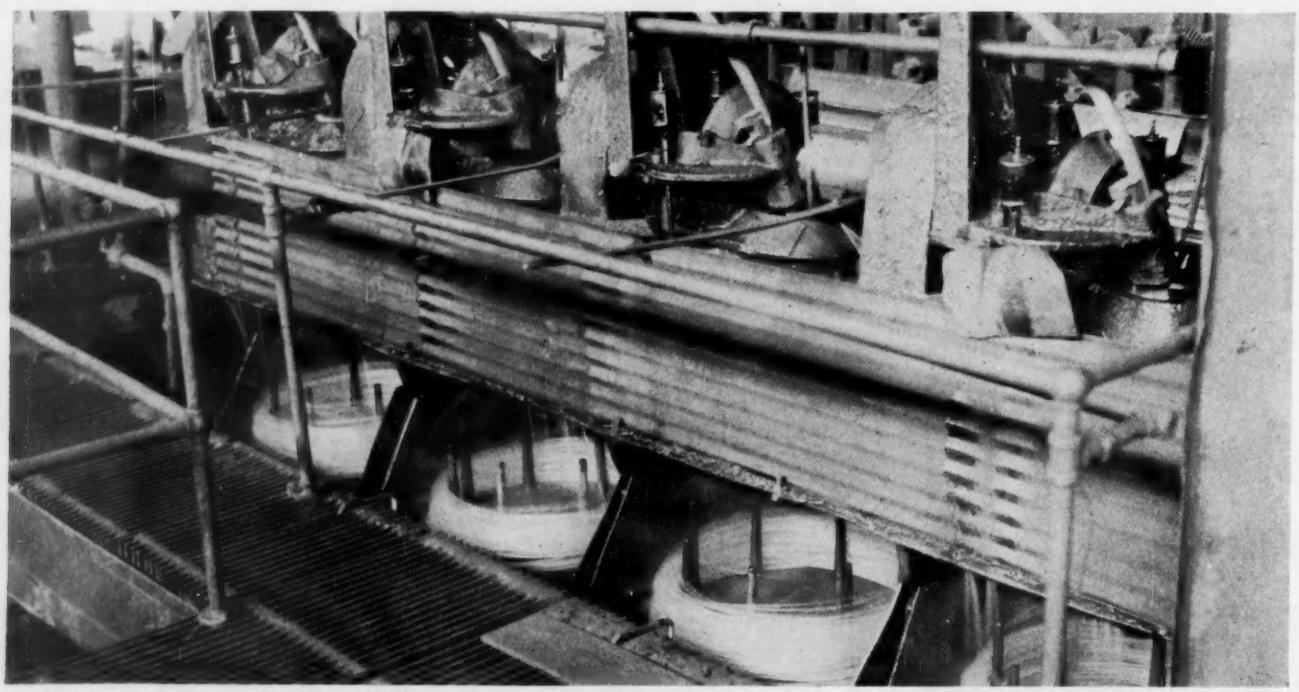
BY F. H. NULLMEYER
Youngstown Sheet & Tube Co.

IN THE primitive days of wire manufacture, strips of metal were hammered out into what was then called wire. Today the metal is rolled into rods, which in turn are drawn into wire.

Mills for rolling wire rods have undergone interesting developments, especially during the last few decades. Rods, which are intended to be drawn into wire when cold, are small in section and therefore cool rapidly. For that reason, when rods were rolled by hand in the old type of mill, where the metal was passed back and forth, it was not easy to deal with billets of more than 10 pounds in weight or to finish in sizes below ½-inch in diameter and 15 feet long.

In 1860, a mill starting with a billet 1¼-inches square could not turn out more than five tons of ⅜-inch rods in 24 hours. Since then inventors have been continuously devising means to run the rod faster through the trains of rolls, until today so little time is occupied in transit that the rod leaves the mill practically as hot as it enters, and with a diameter smaller than was possible under the older process. The usual diameter, at present, is No. 5, or 0.207-inch—although there are two mills in the United States equipped with enough rolls, or additional passes, to produce rods of No. 7, or 0.177-inch diameter, successfully.

For the past 25 years the trend has been to install continuous rod mills in place of the formerly much used



*Rods being strung on reels in a modern continuous rod mill*

# OUR PRESSURE VESSELS STAY IN SERVICE LONGER BECAUSE WE WELD WITH A "SHIELDED ARC"

*The Struthers-Wells Company used Lincoln "Shield-Arc" welders and "Stainweld A" electrodes in fabricating this 18-8 chrome-nickel jacketed vacuum still. The jacket working pressure of the still is 125 lbs. at 600°F. In operation it will be subjected to alternate heating and cooling on mixed acid service.*

*J. T. Dillon, Jr., President*
*Struthers Wells-Titusville Corp., Warren and Titusville, Pa.*

"This vacuum still, Lad, is certainly splendid evidence of Struthers-Wells' skill in welded fabrication work. It's a tribute to their welding ability as well as to shielded arc welding. They must be mighty particular about their welding."

"You're right, Pop. They are so particular that they use the welding equipment which has proved best by test in their own shops, namely Lincoln *'Shield-Arc'* welders and electrodes. You take no chances when you select Lincoln welding equipment. It's guaranteed to give—

1. More weld metal deposit per K. W. H.
2. Faster welding per K. W. H.
3. Lower cost per unit of welding—the unit being per lineal foot of weld, or per pound of weld metal, or per hour of welding."

# LINCOLN

## THE LINCOLN ELECTRIC COMPANY, CLEVELAND, OHIO

*Largest Manufacturers of Arc Welding Equipment in the World*

W-67

looping mills. The looping mills, however, increased output materially over the earlier type of mill where the bar was passed back and forth. Mills of the looping type are known as "Garrett" mills, after the inventor, William Garrett, a Scotchman. The first mill of the Garrett type installed in this country was built in Cleveland, in 1882, by the then Cleveland Rolling Mill Co.

By the use of the looping mills, heavier bundles, or, in other words, longer lengths of rods, could be rolled. The bundles weighed as much as 175 pounds, or 1500 feet of No. 5 rod per bundle, and the mill turned out about 500 gross tons of rods per 24 hours. Nevertheless in 1882, when the first of the Garrett mills was installed, production was but 7 tons per day.

In 1869 the Washburn & Moen Mfg. Co., Worcester, Mass., purchased what was then known as a Bedson mill, invented by George Bedson, of Birmingham, England. This was the first approach to the present day continuous rod mill, which avoids all looping as in the Garrett and other earlier types of mills. The Bedson mill consisted of a series of pairs of rolls arranged alternately horizontally and vertically, and placed as close together as possible, through which the billet traveled in a straight line. By varying the diameters of the gearing, each succeeding pair of rolls was driven at the increase speed necessitated by the growing length and decreasing diameter of the rod. This type of mill failed to produce more than seven tons per day until power driven automatic reels were invented.

Previous to that time it had been common practice—with the short lengths rolled—to wind the rods as fast as they came from the mill upon a spike-studded plate mounted upon a shaft turned by hand by a winch handle. Automatic power driven reels, which increased delivery speed and tonnage, rapidly became a necessity. Several different types of automatic reels are in use today.

Today all rolls are horizontal. Each succeeding pair, from the first roughing set to the last finishing set, runs at increased speed, making allowance for elongation and reduction in size of the billet in the process of conversion into the rod, and finishing at a speed of about 4000 feet per minute per strand. All of the later mills installed in the last 25 years are double strand mills—that is, two strands can be rolled at one time.

At the present time there is being built for installation in a plant in England a continuous mill which will roll four strands and possess a capacity of 40 tons per hour, or practically 1000 tons per 24 hours—double the capacity of the continuous mills in use in the United States. The probability is that at the outset there will be some trouble with this mill, as is usually the case in so radical a departure, but eventually this type, no doubt, will become as common as our present method, and the step from the two-strand mill to the four-strand mill will seem as natural as now does the advance from old hand forged rods to today's continuous mill.

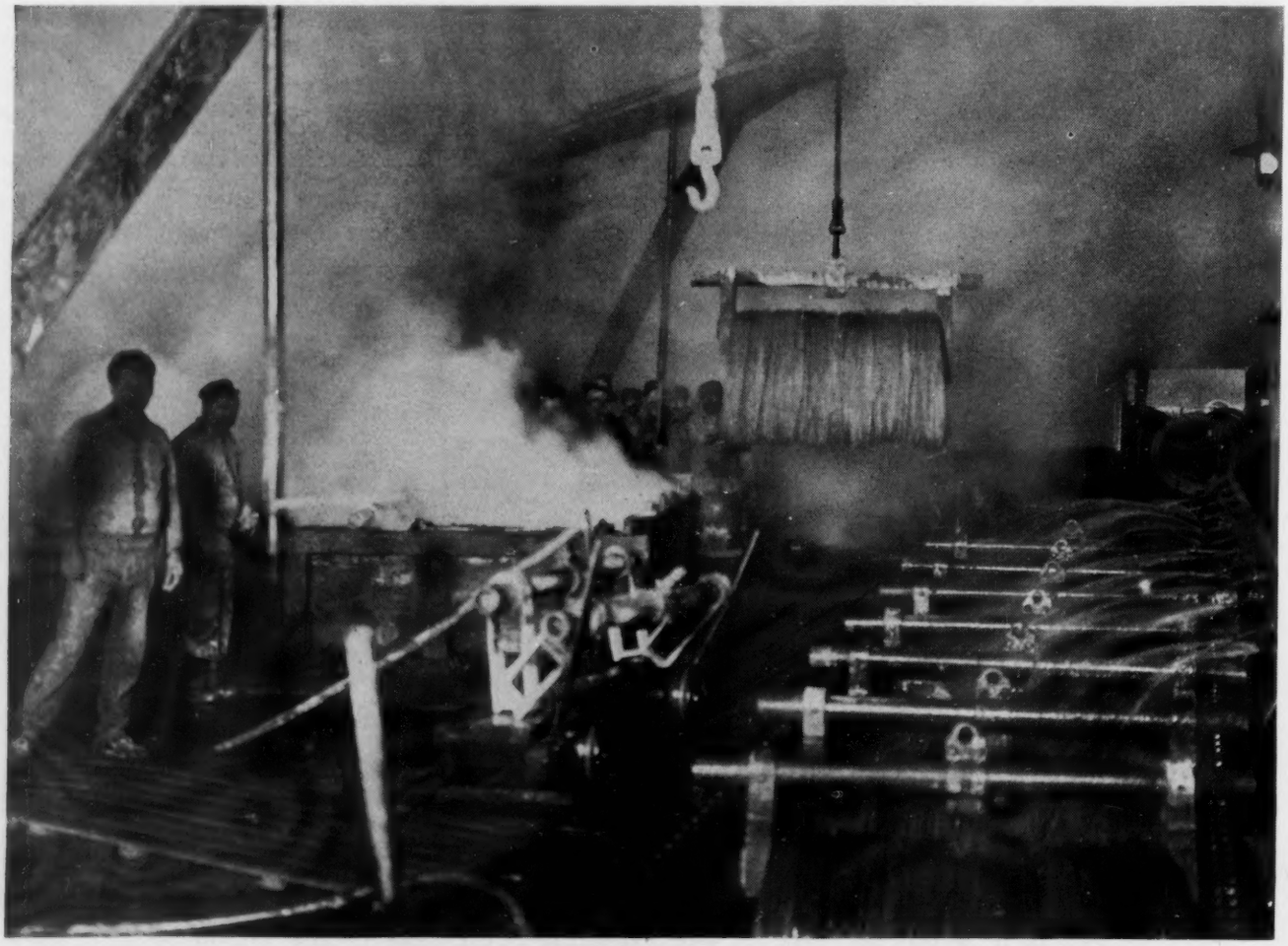
Today the tendency is toward still heavier bundles or longer lengths of rod in the coil. There are good reasons for this tendency, as it makes for greater efficiency and less scrap, both in the rolling of the rod and in succeeding operations, such as the drawing of the wire or the fabricating of articles from the wire.

All hot-rolled ferrous stocks takes

## The Old and New in

*WORKING conditions in cleaning houses have been improved remarkably in the past decade. In the old type, illustrated on this page, the atmosphere was charged with fumes, acid splashed to the floor, and workmen were obliged to wear rubber boots and other protective clothing.*

*In a modern cleaning house, as*



on ferric oxide or scale while cooling. It would be possible, of course, to cool rods suddenly to below scale-forming temperatures, by the use of water, as soon as they leave the mill. This is inadvisable because of the hardening action of sudden cooling. Rods ordinarily leave the last pass of the mill at around 1800 degrees Fahr. If steel at this temperature is cooled suddenly—especially steel with a carbon content higher than 0.15—the resulting hardening action might be extremely detrimental to drawing or to further operations after drawing.

Therefore, scale is inevitable, and scale formed on the rod during cooling must be removed before attempting to draw the rod into wire. Mechanical methods of removing scale have not been commercially successful in cleaning rods in coils, hence chemical methods using diluted acids in water usually are employed.

In Europe, hydrochloric acid is generally used for this purpose on account of its low cost. Sulphuric acid is customarily employed in the United States, although hydrochloric or muriatic acid is selected in some cases in order to get certain results not obtainable with sulphuric acid.

In ordinary practice, removal of scale is accomplished by using approximately a 5 per cent solution of $H_2SO_4$ in water, forming a bath heated to a temperature of about 190 degrees Fahr. In the bath several bundles of rods, weighing up to one or one-and-a-half tons, are supported upon a yoke of wood or acid resistant metal, passing through the inside of the coils.

The rods are allowed to "boil" in the bath for about 20 to 30 minutes until the last vestige of scale is removed from every strand. After this, they are washed to remove sludge and as much of the acid as possible.

From this point on there are variations in successive operations, depending upon what kind of wire is desired to be made from the cleaned rods. If the wire is to be finished in but one or two drafts, and is to have a bright silvery finish, the rods are dipped in a weak lime solution. If the wire is to be drawn by many drafts to a small size, the rods are given what is known as a sull coat, which is produced by spraying the rods with a mist of clean, cold water. The amount of sull desired determines how long they should be sprayed. After sulling, they are dipped in a lime solution heavier than that used for larger sizes.

In either case, after lime-coating, the rods are placed in a baker and baked for several hours at a temperature of about 350 degrees Fahr. The purpose of baking is to remove hydrogen from the rod and to correct brittleness developed in pickling. An air recirculating baker, developed within the last few years, is said to speed up baking time materially.

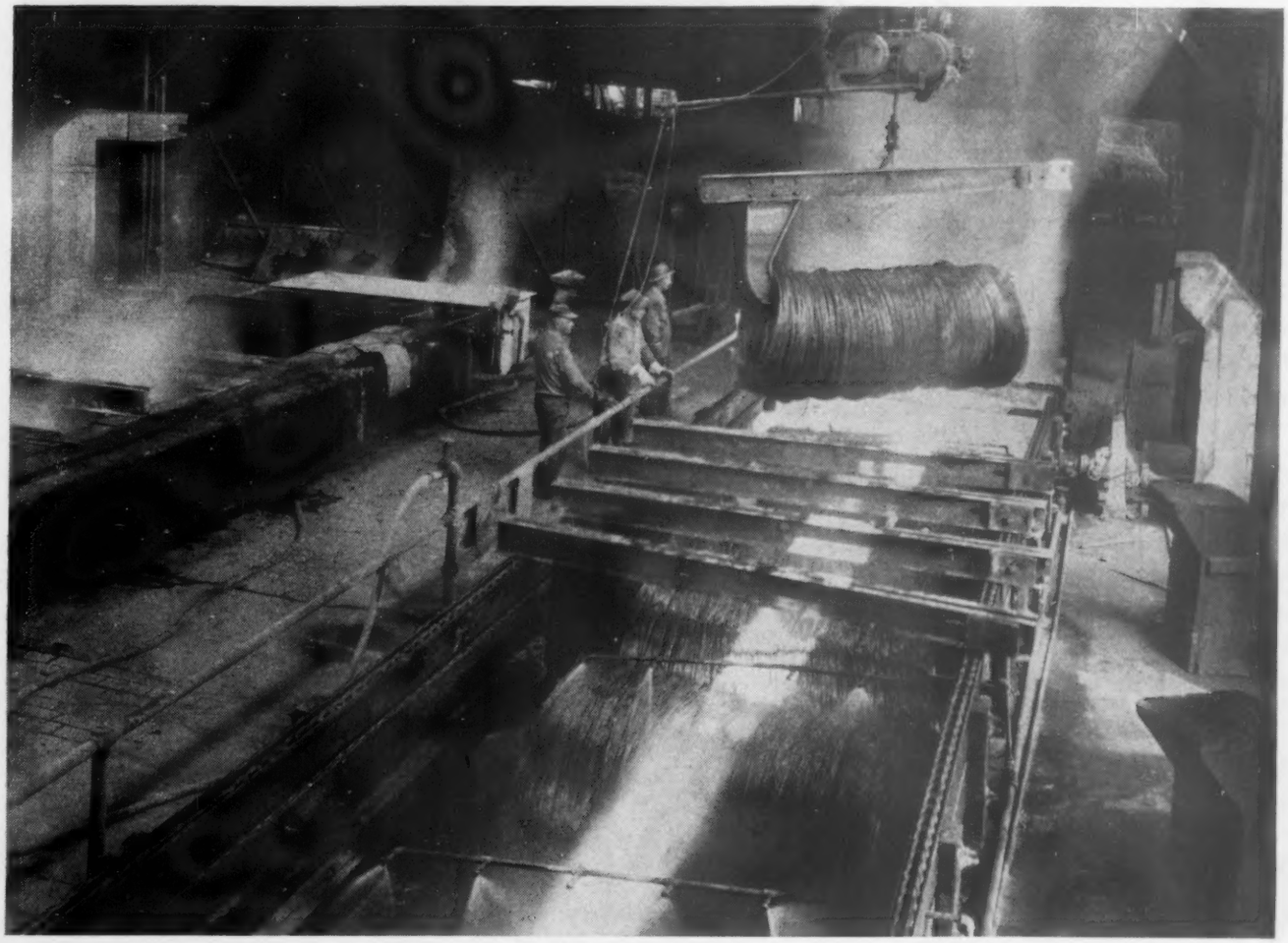
In the last few years there have been improvements with respect to the pickling process, both in working conditions and efficiency of operation. At the present time there are a number of devices on the market, called "inhibitors," which serve to prevent undue acid action on the clean surface of the rod after scale has been removed, which wastes both metal and acid. These devices also help to form a foam blanket on the top of the bath, which prevents undue escape of acid, heat and steam, and makes the cleaning house a better place in which to work.

A modern cleaning house of today is a far different place than was its

## ew in Cleaning Houses

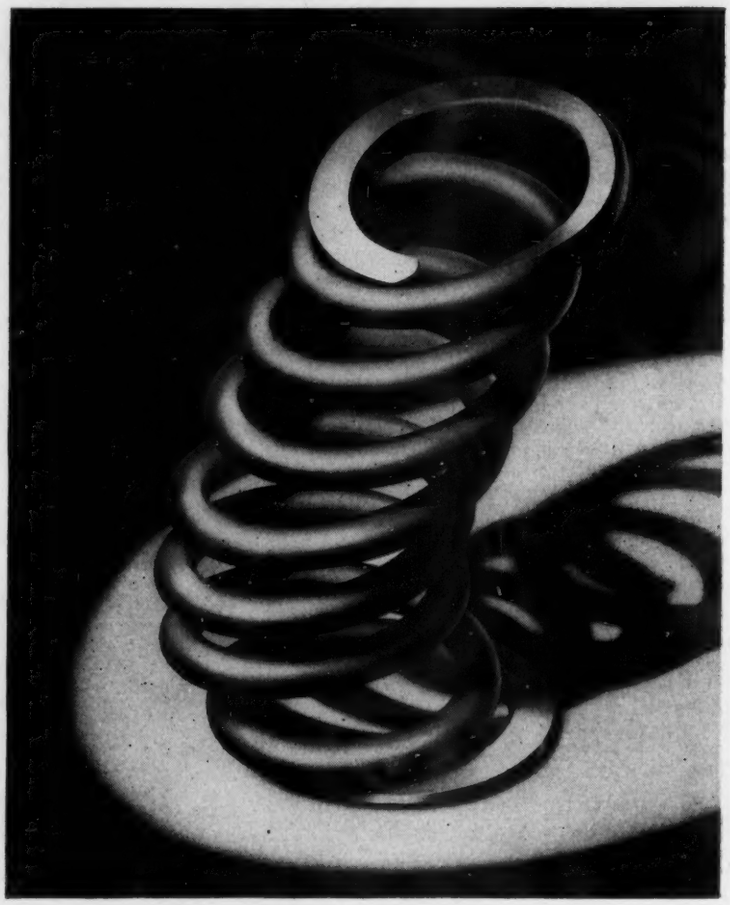
*shown at the right, the air is free from fumes and steam, the floor is dry, an electric hoist handles the rods, and working conditions are such that workmen need no protective clothing.*

*The modern cleaning house, and the mills shown on page 48, are in the wire department of the Youngstown Sheet & Tube Co.*



# Silicon-Vanadium Steel is *TOUGH!*

Still unbroken after being struck with a 2240-lb. weight dropped from a height of 35 feet.



## *it's the ideal steel for helical suspension springs*

A Silicon-Vanadium helical suspension spring . . . 4¾" O. D. . . . made from a ⅝" bar . . . with a tensile strength of more than 200,000 lbs. . . . was recently submitted to a rather crude but interesting—and convincing test. A 2240-lb. weight was dropped on the spring from a height of 35 feet. How well the tough Silicon-Vanadium Steel spring withstood the terrific impact is shown by the photograph.

Characteristic of Silicon-Vanadium Steel is a combination of high elastic limit and great toughness which makes it an ideal steel for helical suspension springs. For several years, thousands of railway cars in the United States and Europe have demonstrated the superiority of Silicon-Vanadium Steel for equalizer coil springs. Silicon-Vanadium Steel is the one steel with any extensive performance record in helical suspension spring service.

Silicon-Vanadium Steel may be the solution of your coil spring problems. Engineers of the Vanadium Corporation of America will be glad to cooperate with you.

VANADIUM CORPORATION OF AMERICA
120 BROADWAY, NEW YORK, N. Y.
CHICAGO PITTSBURGH *Bridgeville, Pa.* DETROIT
Plants at Bridgeville, Pa., and Niagara Falls, N. Y.
Research and Development Laboratories at Bridgeville, Pa.

VANCORAM

FERRO-ALLOYS *of vanadium, silicon, chromium, titanium and silico-manganese, produced by the Vanadium Corporation of America, are used by steel makers in the production of high-quality steels.*

# VANADIUM STEELS

*for strength, toughness and durability*

prototype of 10 years ago. At that time pickling was done in wooden tubs, set in a semicircle. Tubs were constantly leaking, and so much steam arose, especially in cold weather, that it was impossible to see across the room. Workmen wore rubber boots and aprons to protect their bodies from splash and slop on the floor. I often wonder how it was possible to tell whether the stock was clean under those conditions. As a matter of fact, it was not always possible, and considerable stock ready for drawing was often sent back to be recleaned.

About 13 years ago, endeavoring to cut down repairs of pickling tubs and loss of acid by leakage, and improve working conditions, I experimented with a brick tub constructed with joints laid up with a compound consisting of sulphur and fine sand. This acid tub was tried out for five years, and proved so successful that the entire cleaning house was rebuilt with brick tubs of this type, set in a straight line, and served with overhead electric traveling hoists.

This installation was completed eight years ago last November. In place of the old repairs, we have had no repairs to speak of, other than replacement of drain plugs, and planking upon the top of the tubs, upon which the yokes rest. Instead of leaking, the tubs have grown tighter from constant condensation of steam used to heat the solution. Waste heat is used to heat the building. It is warm, the floor is dry and the air is practically free from steam. The workmen's vision is not obscured; they work in ordinary clothes and shoes.

*In next week's issue, Mr. Nullmeyer, who is superintendent of the rod wire and conduit department, Youngstown Sheet & Tube Co., Youngstown, O., will discuss recent trends in methods and equipment for wire drawing.*

THE EDITORS

# Steel May Be Age Hardened Soon

PRECIPITATION or age hardening of steel has not been attempted commercially, however, this is a likely prospect for the future. This was the opinion expressed by Dr. Paul D. Merica, assistant to president, International Nickel Co. Inc., New York, in addressing the Cleveland chapter of the American Society for Metals, March 12, on the subject of precipitation hardening in metals. It was Dr. Merica, who, as a result of research work performed some 15 years ago, first advanced the theory of precipitation hardening.

Dr. Merica emphasized that since investigational work thus far has been confined largely to the nonferrous field, practical application of the precipitation hardening method was made in this branch of the industry first. Work now under way indicates that the method may be applied soon in hardening steel.

It is well known that low-carbon steel sheets age harden if they stand for any length of time before being drawn. E. E. Thum, editor, *Metal Progress*, Cleveland, raised a question as to whether the customary roller leveling operation applied to age hardened sheets just prior to drawing reverses the age hardening mechanism. In reply, Dr. Merica expressed the opinion that there is no definite connection between the two phenomena; probably roller leveling renders the age hardened sheets suitable for drawing by a lowering of the yield point through the mechanical work applied.

Commenting upon the same problem, Dr. Zay Jeffries, consulting engineer, Cleveland, and technical chairman of the meeting, explained that in the precipitation hardening mechanism there appears to be a period during which metal softens prior to age hardening. If the recently leveled sheets are drawn during this softening period, no difficulty is experienced; if drawing is delayed, difficulty may be encountered.

# Making Ford Cast Alloy Shafts

(*Concluded from Page 27*)

to a temperature of 1450 degrees Fahr. and allowed to soak for an hour. They are removed from this furnace and air cooled to a temperature of 800 degrees Fahr., then placed in a second furnace where the first treatment is repeated. Upon removal from the second furnace, they are air cooled rapidly to 800 degrees, then allowed to cool slowly to atmospheric temperature.

Brinell hardness of the heat-treated castings averages 302, as compared with 200 for forged shafts before and 444 after machining and hardening. However, the hardness of the cast shaft is uniform throughout, while the forged shaft presents varying degrees of hardness from the outside to the center. It is claimed that this is one factor which is partly responsible for the marked superiority of the cast shaft over the forged shaft in resistance to torsional stress and evidence of fatigue.

In a machine designed to measure fatigue the shaft is held horizontally by the three main bearings. The center bearing is 1/32 inch out of line in relation to the two end bearings. Thus the shaft is sprung a total of 1/16 inch and while in this position is revolved at a speed of 1200 revolutions per minute. Under this severe, racking test, the cast shaft does not show any indication of fatigue or fiber stress during a period ranging from 60 to 90 minutes. Under the same conditions the forged shaft begins to show failure in about one-half the time.

Obviously, this test does not constitute part of the regular production routine. It was designed and operated during the preliminary or experimental stages in the development of the cast crankshaft. With the superiority of the cast over the forged crankshaft established, this test now is applied only occasionally.

A torsion resistance test forms part of the regular routine in the finishing shop. Every shaft on the way to the assembly line is placed in a fixture where a twisting strain of 40,000 inch-pounds is applied. It is claimed that this is approximately ten times the stress which the shaft will ever meet in service.

In this test a flange is attached by four bolts to the driving end of the shaft. This flange in turn engages one end of a short horizontal member in which the vertical pressure of a hydraulic plunger at the other end is translated into a revolving movement at the flange end.

In addition to other desirable features the cast crankshaft is considerably lighter than the forged steel shaft. This is due to certain features in design entirely feasible in the foundry, but outside the scope of practical accomplishment in the forge. The cast shaft weighs 65 pounds rough and 56 pounds finished, as compared with 90 pounds in the rough forging and 66 pounds finished.

# Report Progress in Revision Of Material Standards

(*Concluded from Page 44*)

laboratories that can handle such tasks for those whose own laboratories are not so equipped. It is also desired that apparatus and methods being used for study of the possible future applicability to high-temperature investigations of so-called "accelerated" methods be listed. Requests for further information on this project should be addressed to N. L. Mochel, Westinghouse Electric & Mfg. Co., Lester station, Philadelphia.

Committee on fatigue of metals:

Reviewed preliminary arrangements for a co-operative undertaking with a subcommittee on X-ray methods to study the effect on atomic structure of metals of the starting of a spreading crack by repeated application of lead.

Arranged for a study of limiting loadings and number of applications of load which cause appreciable weakening of material in withstanding the destructive effects of subsequent loads.

Committee A-3 on cast iron:

Reviewed work of subcommittee on impact testing in development of a standard method for testing cast iron under repeated shock.

Voted to participate in a joint A. S. T. M.-American Foundrymen's association session on testing of cast iron to be held at the International Foundry Congress in Phliadelphia, Oct. 22-26.

# NEW EQUIPMENT

PRODUCTION FABRICATION
TREATMENT FINISHING

**Automatic Welder**—Thomson-Gibb Electric Welding Co., 163 Pleasant street, Lynn, Mass., recently introduced a new automatic welding machine to produce welded mats for road reinforcing and other steel fabrics. It handles rods or wires of any size from ½-inch down to as low as may be required.

The machine, shown below, is completely automatic. Longitudinal and cross wires are fed directly from reels except when the cross wires are heavier than No. 2. Heavy cross wires and rods, straightened and cut to size in advance, feed automatically from a magazine. Cross and longitudinal spacing is fully adjustable.

The welded mats are delivered either flat or reeled to suit the weight of the fabric and can be slit automatically by the machine to make strips of two widths at the same time. The machine makes 32 or more welds at one time and produces as much as 60 tons of welded fabric in a 10-hour day. Other models are available for the heaviest kinds of bar mats.

♦ ♦ ♦

**Honing Tool**—Hutto Engineering Co. Inc., 515 Lycaste avenue, Detroit, has developed a method of honing connecting rod crankpin bores consistently straight, round and true to precise limits. The method consists of individual honing with a special tool in combination with a suitable fixture for accurately locating the connecting rod bore concentric with the hone and holding the work in place. A machine, either single or multiple spindle, can be supplied to meet individual requirements. The hone may be equipped with either an automatic drivehead or a standard micrometer set and stop drivehead. When the former is employed the hone expands and contracts automatically as it enters or leaves the crankpin bore.

"Floating" action of the stone-holders permits a universal motion of the abrasives in relation to the axis of the rod bore. Because of this motion of the abrasives, it is said that lack of squareness between the connecting rod faces and the nominal axis of the bore does not affect the accuracy of the bore produced. An automatic stop, regulating the expansion of the abrasive stones, affords the operator complete control of the ultimate bore size and eliminates the possibility of honing oversize.

♦ ♦ ♦

**Push Button**—Electric Controller & Mfg. Co., 2700 East Seventy-ninth street, Cleveland, is marketing a new push button for use in connection with remote control of automatic motor starters. The unit, designated 270-A type J form C, is vapor proof and dust tight. This push button is for 3-wire low voltage protection installations where it is desired to start and stop a motor through its magnetically-operated starter or controller from two or more push button control stations, at any one of which it may be desired to lock the push button in the "off" position to prevent operation of the motor-driven machine.

♦ ♦ ♦

**Internal Grinders** — Hisey-Wolf Machine Co., Cincinnati, recently announced an internal precision grinder made in four sizes ½, 1, 2 and 3 horsepower. These units are designed for a wide range of internal grinding and are readily adaptable for use with lathe and boring mill. The constant speed motors with which the grinders are equipped, operate at practically the same speed under any load within their rated capacity. It is possible to do internal grinding up to the full swing of any lathe or boring mill. A dovetail slide with screw feed and handle affords rapid adjustment of the wheel to the center of the work. This adjustment due to the angle of slide does not affect belt tension.

♦ ♦ ♦

**Liquid Level Control**—Swartwout Co., 18511 Euclid avenue, Cleveland, recently placed on the market a liquid level control. A feature of the device is the fact that the float chamber is equipped with stainless steel ball bearings. This is claimed to eliminate friction caused by liquid under pressure. The unit will operate valves at any distance up to 300 feet and construction permits pressures up to 450 pounds. Applications cover liquid level control in tanks, condensers, receivers and other vessels.

♦ ♦ ♦

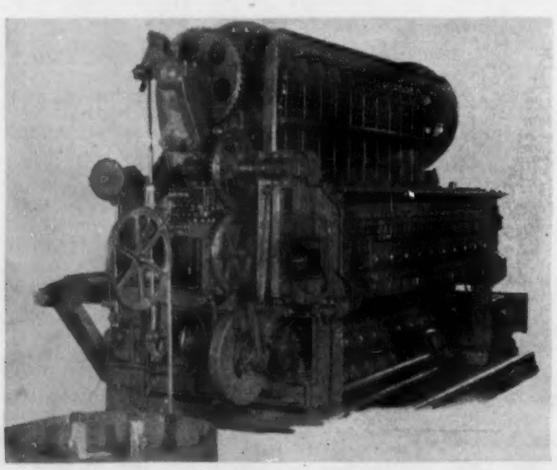
**Small Heating Units**—General Electric Co., Schenectady, N. Y., has developed a new heating unit which contains a sheath-wire winding about which is cast a heavy block of lead. The design is intended to retard chemical action on lead-sheathed units used for heating corrosive solutions such as pickling and plating baths. The company also has announced a new copper-sheathed unit to meet the need for a heating device that can be carried about, placed in almost any vessel containing water, and plugged into an ordinary power circuit to heat the water.

♦ ♦ ♦

**Switch Enclosures**—Square D Co., Switch & Panel div., Detroit, is offering its line of compact switches in dust-tight and weatherproof cast iron enclosures. Features are the same as those of the 50,000 series in standard sheet metal boxes, namely quick-make, quick-break, interlock and easily removable base which is elevated from the back of the box to permit wiring under the base.

♦ ♦ ♦

**Electronic Timer**—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has developed a new electronic timer which measures out a preset length of time and closes or opens its contacts for that time after the initiating impulse given from a push button, foot treadle, or cam-operated switch. The device is used for such operations as the timing of spot and projection welder current flow, X-ray timing, and other similar applications requiring an easily adjustable and ac-



*THOMSON-GIBB automatic welder for producing road reinforcing mats and wire fabrics. Longitudinal and cross wires are fed directly from reels except when the latter are heavier than No. 2. Heavy cross wires and rods feed automatically from a magazine*

# To Production Executives

## *Sunoco Helps You Secure ..Rated Machine Tool Capacity ..at Minimum Cost*

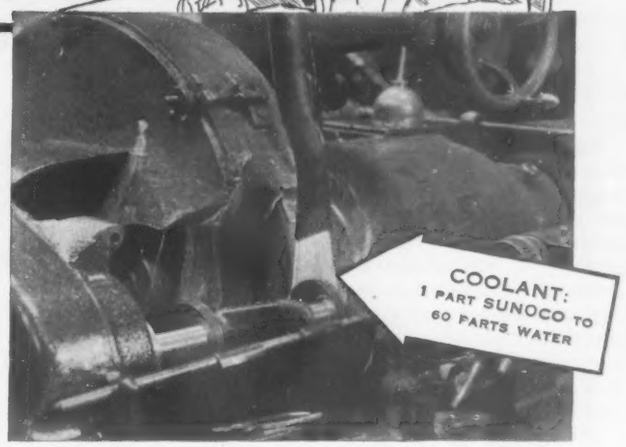
IN your efforts to lower machining costs, don't overlook the real importance of an efficient cutting lubricant. Without it, machine tools will not operate at rated capacity. And it is significant that machine tool manufacturers use and recommend Sunoco Emulsifying Cutting Oil.

### *Faster and Deeper Cuts Made Possible*

With the aid of Sunoco, many executives have definitely increased machine hour production. Faster and deeper cuts are possible. Work is kept cooler. Accuracy and finish, even at higher speeds, are kept at the same high plane. Longer runs between tool grinds and less lost time for re-setting, too, make for economy.

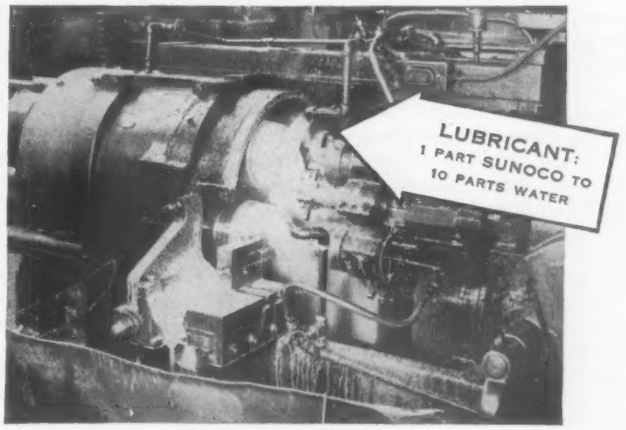
The ability to estimate the production capacities of cutters, drills, taps, reamers and other small tool equipment, is a valuable aid in computing manufacturing costs. The uniformity of Sunoco permits accurate prediction on the quantity of work that machine tools will produce.

*It will pay you to get the facts on Sunoco. Tests in your plant will gladly be made, and our experienced cutting oil engineers are at your service.*




*Courtesy of* **MUSKEGON MOTOR SPECIALTY** *Co. Jackson, Mich.*

OPERATION: FINISH GRIND. CRANKSHAFT CENTER MAIN BEARING, PLUNGER CUT.
MACHINE: LANDIS GRINDER.
MATERIAL: H. R. TYPE "E. E." STEEL.
SPINDLE SPEED: 750 R.P.M.
WHEEL SIZE: 30 INCH DIAM., 2.188 INCH FACE.
STOCK REMOVAL: .025 INCH.
PRODUCTION: 40 PER HOUR.




*Courtesy of* **NATIONAL ACME** *Co., Cleveland, Ohio*

OPERATION: ROUGH BORE AND ROUGH TURN STEEL FORGING.
MACHINE: GRIDLEY 4-SPINDLE, 4½ INCH CHUCKING MACHINE.
SPINDLE SPEED: 160 R.P.M.
BORE: 129 FEET PER MINUTE.
TURN: 114 FEET PER MINUTE.

**SUNOCO**
**EMULSIFYING**
**CUTTING OIL**

*Made by the producers of* BLUE SUNOCO MOTOR FUEL

NRA WE DO OUR PART

**SUN OIL COMPANY**
**PHILADELPHIA**

*Offices and Warehouses in More Than 100 Cities*
*Subsidiary Companies:* Sun Oil Co., Ltd., Montreal
British Sun Oil Co., Ltd., London, Eng.

curately maintained time delay.

The time measured out is continuously adjustable from 1/10 second to 45 seconds. It can be applied to any spot or projection welding machine now in service which is equipped with a magnetic main contactor. Contactor in the unit has a contact capacity of 10 amperes at 115 volts and 5 amperes at 220 volts alternating current.

♦ ♦ ♦

**Condensate Remover**—Coe Mfg. Co., Painesville, O., is introducing a device for removing condensate from steam condensing units, kettles, presses, heating and processing machines. It has no moving parts and relies for its operation on the thermodynamic properties of steam and hot water to regulate the flow through the device. The range of sizes available is wide enough to accommodate any drainage condition.

♦ ♦ ♦

**Milling Cutter**—Carboloy Co. Inc., 2481 East Grand boulevard, Detroit, recently developed a general purpose face-milling cutter for universal use on cast iron, nonferrous and nonmetallic materials. The cutter, shown herewith, is 5 inches in diameter and may be used over a wide range of cutting areas on these materials. Heretofore the economical use of Carboloy milling cutters has been confined mainly to large, quantity-production jobs. This new general purpose cutter has been developed for economical use on short-run, diversified milling jobs as well, it being possible to use the standard cutter interchangeably on various milling jobs in the same manner as a high-speed steel cutter.

In announcing this general-purpose cutter, the company points out that it is not intended to replace its special cutters on large, quantity production jobs, as on this type of work the most efficient results are obtained with cutters especially designed for maximum performance. To make the general purpose cutter practical modified designs are employed to produce economical results without the sensational increases in speeds, etc. which are common to Carboloy milling on large, quantity-production jobs. All

*Carboloy general purpose milling cutter for short-run jobs*

of the benefits of cemented carbide milling on these large production jobs are, however, obtained with the general purpose cutter to an extent which permits a substantial saving on general milling work.

♦ ♦ ♦

**Power Shear**—Dreis & Krump Mfg. Co., Seventy-fourth street and Loomis boulevard, Chicago, recently brought out a new power shear to meet the demand for high-speed cutting with greater accuracy. One of the important features of the unit is the new type back gage, operated from the front of the shear.

The accompanying illustration shows the operating crank of the gage and dial which is graduated in inches and sixty-fourths of an inch. Dial graduations are double scale so that accurate reading is made quickly and easily. Both screws are operated in unison, maintaining the gage in alignment with the knife at any position. Gage locks automatically at any setting and gage screws can be disconnected for taper cutting.

Other features include low cutting angle of the upper blade, high-pressure holddown and rigid all steel plate construction. The one-piece holddown straightens out any buckles or uneveness in the sheet before shearing is started. Individual holddown fingers are optional.

♦ ♦ ♦

**Air-Cooled Engine**—Doman-Marks Co., Amesbury, Mass., recently added a new direct air-cooled engine to its line of industrial units. It has a 4⅛-inch bore and 5-inch stroke and develops 111 horsepower at 2600 revolutions per minute. Many of these engines now are operating as power for air compressors, trucks, railcars, etc.

♦ ♦ ♦

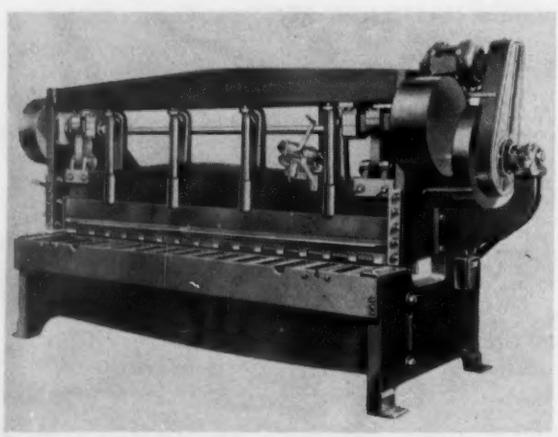
**Packing Ring**—American Metallic Packing Co., Pittsburgh, recently introduced a new type of packing ring. Use of a new hoop spring obviates trouble in addition to providing even and constant tension. The complete list includes packing for every standard use in connection with steam, air, gas, gaseous ammonia and $CO_2$ equipment. One of the special items is packing for high-pressure compressors up to 1200 pounds, and similar installations.

♦ ♦ ♦

**Clutch**—Morse Chain Co., Ithaca, N. Y., is marketing a new one-way clutch, free-wheeling in one direction but driving in the other. Used to connect two prime movers to a common load, either will pull the load but neither can drive the other. This dual drive finds frequent application for two motors, motor and turbine or induced draft fans as well as for auxiliary standby drive, and for booster drives for heavy machines such as steel mill units.

♦ ♦ ♦

**Fuses**—Jefferson Electric Co., Bellwood, Ill., is offering a new line of fuses. These units incorporate a principle that prevents blowouts until the current overloads has continued for a sufficient space of time to be dangerous. Thus needless blowouts are eliminated and safe margins of overload protection are maintained. Super-lag fuses as they are known, are made in all standard ratings in both knife-blade and ferrule types.



*POWER shear designed by Dreis & Krump Mfg. Co. A new type back gage operated from the front of the machine is a feature that saves the operator many steps and considerable time. The gage locks automatically at any setting*

# Steel at Turning Point, Depending on Labor

## Trend Awaits Settlement of Issues—Railroad, Miscellaneous Demands Offsetting Automotive Slackening—Coke Stocks Are Being Built Up

UNCERTAINTIES regarding labor are casting a pall over the production phase of steel, as well as the major consuming outlet, the automobile industry.

This is offset in considerable degree at the moment by railroad and miscellaneous demands. But whether the steel industry has passed the peak in the spring bulge of production, or merely is in a shallow valley, depends on adjustments in the labor situation.

The unsettlement has penetrated deeply enough to cause Ford output to level off, and Chevrolet to reduce its assemblies slightly in the past week. Releases from many automotive consumers have tapered off moderately.

Trustworthy reports to STEEL indicate thus far steelworks operations have varied negligibly. Predictions made by other sources at the beginning of last week that the rate would be sharply curtailed proved exaggerated, because capacity scheduled to be taken off remained in production.

Actually the rate was 50 per cent, a loss of 1 point from the preceding week. Gains at Pittsburgh and eastern Pennsylvania practically offset weakness at Chicago and in New England. For this week, Pittsburgh and Youngstown mills indicate a recession, with other districts approximately unchanged.

### Steelmakers Not Urging Users To Contract; Structural Awards Include Two 5000-Ton Jobs

Faced by prospects of higher costs, steelmakers are not urgently seeking commitments for second quarter. They estimate that with a 10 per cent proposed reduction in hours of labor, there will be need for about 12 per cent more workers, and in that event foresee a shortage of skilled labor.

Suspension of shipments to automobile manufacturers have been relatively few, though lighter specifications are being issued. The chief improvement in the market emanates from railroads which are releasing rails, cars and material recently awarded. New rail orders in the week include 18,000 tons for three western lines.

Topped by 5000 tons for a New York apartment house, and 5000 tons for the Fore river, Quincy, Mass., bridge superstructure, shape awards increased last week to 21,533 tons. Though the total so far this year—206,577 tons—is twice that of last year, slowness in construction is reflected by comparison with the average of 454,000 tons in the same periods in five years, 1927-31. Some larger tonnages are pending for early action. For a sanitation project at Cleveland 2500 tons of concrete bars have been awarded.

The first orders for steel barges placed at Pittsburgh in many months call for 1000 tons of steel. The farm equipment industry is operating at about 40 per cent, highest since 1930. A leading manufacturer of electric refrigerators has the best production schedule in its history. Heavier miscellaneous demands for tin plate contribute to mill operations at 80 per cent.

### Scrap Shows Mixed Trend, with Average Up; Beehive Furnace Coke Price Off

Prices of some grades of scrap have reacted to the heavier offerings at recent peak levels, but STEEL's scrap composite registers another gain of 8 cents to $12.41. Bethlehem Steel Co. has purchased 25,000 tons for its Lackawanna, N. Y., mills which are resuming rail production.

Beehive furnace coke is off 25 cents a ton. With consumers evidently stocking up, 109 more ovens in the Connellsville region were lighted last week, bringing the number active to 1589, identical with March, 1931. Bessemer pig iron has been reduced $4 a ton at Birmingham. Ferroalloy prices have been extended for second quarter. Ford is preparing an inquiry for iron ore, which may establish the season's prices.

Steelworks operations last week advanced 1 point to 35 per cent at Pittsburgh; and 1 to 2 points to 32 to 33 per cent, eastern Pennsylvania. The Chicago rate was down 1½ points to 48½ per cent; other districts remaining unchanged.

American mills' share of a 40,000-ton steel pipe order anticipated from Russia has been increased from 16,000 to 28,000 tons. Tata Iron & Steel Works, India, has ordered 221 steel mill rolls from Pittsburgh makers, such orders previously going to England. Iron and steel consumption in Great Britain is rising, as shown by STEEL's cabled reports. Reduced to a daily average basis, steel ingot output in February rose 7.8 per cent; pig iron, 4 per cent; imports were up 13.9 per cent, while exports declined 3.9.

STEEL's iron and steel price composite holds at $32.40; and the finished steel index, $51.10

# COMPOSITE MARKET AVERAGES

| | March 17 | March 10 | One Month Ago Feb., 1934 | Three Months Ago Dec., 1933 | One Year Ago March, 1933 | Ten Years Ago March, 1924 |
|---|---|---|---|---|---|---|
| Iron and Steel Composite | $32.40 | $32.40 | $32.42 | $32.42 | $28.35 | $43.24 |
| Finished Steel Composite | 51.10 | 51.10 | 51.10 | 51.10 | 45.60 | 67.18 |
| Steelworks Scrap Composite | 12.41 | 12.33 | 11.72 | 10.12 | 6.47 | 16.98 |

Iron and Steel Composite:—Pig iron, billets, slabs, sheet bars, wire rods, tin plate, nails, sheets, plates, shapes, bars, and black pipe. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

# A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

| | March 17, 1934 | Feb. 1934 | Dec. 1933 | Mar. 1933 |
|---|---|---|---|---|
| **Finished Material** | | | | |
| Steel bars, Pittsburgh | 1.75 | 1.75 | 1.75 | 1.60 |
| Steel bars, Chicago | 1.80 | 1.80 | 1.80 | 1.70 |
| Steel bars, Philadelphia | 2.04 | 2.04 | 2.04 | 1.91 |
| Iron bars, Terre Haute, Ind. | 1.60 | 1.60 | 1.60 | 1.65 |
| Shapes, Pittsburgh | 1.70 | 1.70 | 1.70 | 1.60 |
| Shapes, Philadelphia | 1.90 | 1.90½ | 1.90½ | 1.65 |
| Shapes, Chicago | 1.75 | 1.75 | 1.75 | 1.70 |
| Tank plates, Pittsburgh | 1.70 | 1.70 | 1.70 | 1.60 |
| Tank plates, Philadelphia | 1.88 | 1.88½ | 1.88½ | 1.59½ |
| Tank plates, Chicago | 1.75 | 1.75 | 1.75 | 1.70 |
| Sheets, No. 10, hot rolled, Pitts. | 1.75 | 1.75 | 1.75 | 1.55 |
| Sheets, No. 24, hot ann., Pitts. | 2.25 | 2.25 | 2.25 | 2.00 |
| Sheets, No. 24, galvan., Pitts. | 2.85 | 2.85 | 2.85 | 2.60 |
| Sheets, No. 10, hot rolled, Gary | 1.85 | 1.85 | 1.85 | 1.70 |
| Sheets, No. 24, hot anneal., Gary | 2.35 | 2.35 | 2.35 | 2.10 |
| Sheets, No. 24, galvan., Gary | 2.95 | 2.95 | 2.95 | 2.70 |
| Plain wire, Pittsburgh | 2.20 | 2.20 | 2.20 | 2.10 |
| Tin plate, per base box, Pitts. | 5.25 | 5.25 | 5.25 | 4.25 |
| Wire nails, Pittsburgh | 2.35 | 2.35 | 2.35 | 1.85 |
| **Semifinished Material** | | | | |
| Sheet bars, open-hearth, Youngs. | 26.00 | 26.00 | 26.00 | 26.00 |
| Sheet bars, open-hearth, Pitts. | 26.00 | 26.00 | 26.00 | 26.00 |
| Billets, open-hearth, Pittsburgh | 26.00 | 26.00 | 26.00 | 26.00 |
| Wire rods, Pittsburgh | 36.00 | 36.00 | 36.00 | 35.00 |

| | March 17, 1934 | Feb. 1934 | Dec. 1933 | Mar. 1933 |
|---|---|---|---|---|
| **Pig Iron** | | | | |
| Besemer, del. Pittsburgh | 19.26 | 19.26 | 19.26 | 15.76 |
| Basic, valley | 17.00 | 17.00 | 17.00 | 14.00 |
| Basic, eastern, del. eastern Pa. | 18.76 | 18.76 | 18.76 | 13.50 |
| No. 2 foundry, del. Pittsburgh | 18.76 | 18.76 | 18.76 | 15.76 |
| No. 2 foundry, Chicago | 17.50 | 17.50 | 17.50 | 15.50 |
| Southern, No. 2, Birmingham | 13.50 | 13.50 | 13.50 | 11.00 |
| No. 2X, Eastern, del. Philadelphia | 19.63 | 19.63 | 19.63 | 13.76 |
| Malleable, valley | 17.50 | 17.50 | 17.50 | 14.50 |
| Malleable, Chicago | 17.50 | 17.50 | 17.50 | 15.50 |
| Lake Superior charcoal, del. Chi. | 23.54 | 23.54 | 23.54 | 23.04 |
| Gray forge, del. Pittsburgh | 18.38 | 18.38 | 18.38 | 15.63 |
| Ferromanganese, del. Pittsburgh | 90.24 | 90.24 | 87.24 | 73.24 |
| **Scrap** | | | | |
| Heavy melting steel, Pittsburgh | $14.50 | 13.90 | 12.20 | 8.75 |
| Heavy melting steel, eastern Pa. | 11.75 | 11.75 | 10.25 | 6.50 |
| Heavy melting steel, Chicago | 12.25 | 10.90 | 9.00 | 5.25 |
| No. 1 wrought, eastern Pa. | 12.75 | 12.75 | 11.00 | 6.75 |
| No. 1 wrought, Chicago | 10.90 | 10.50 | 8.45 | 5.00 |
| Rails for rolling, Chicago | 12.75 | 11.90 | 10.35 | 7.95 |
| **Coke** | | | | |
| Connellsville, furnace, ovens | 3.25 | 3.50 | 3.75 | 1.75 |
| Connellsville, foundry, ovens | 4.25 | 4.25 | 4.25 | 2.25 |

# Steel, Iron, Raw Material and Metals Prices

*Prices conform to American Iron and Steel institute schedules. Asterisks denote price changes this week*

## Sheet Steel

HOT ROLLED No. 10
(24 to 48 inches wide)

| | |
|---|---|
| Pittsburgh, base | 1.75c |
| Gary, base | 1.85c |
| Chicago, del. | 1.88c |
| New York, del. | 2.08c |
| Philadelphia, del. | 2.04c |
| Birmingham, base | 1.90c |
| St. Louis, del. | 2.07c |
| F.o.b. cars, dock, Pacific ports | 2.42½c |

HOT ROLLED ANN. No. 24

| | |
|---|---|
| Pittsburgh, base | 2.25c |
| Gary, base | 2.35c |
| Chicago, del. | 2.38c |
| Detroit, del. | 2.45c |
| New York, del. | 2.58c |
| Philadelphia, del. | 2.54c |
| Birmingham, base | 2.40c |
| St. Louis, del. | 2.57c |
| F.o.b. cars, dock, Pacific ports | 2.95c |

GALVANIZED No. 24

| | |
|---|---|
| Pittsburgh, base | 2.85c |
| Gary, base | 2.95c |
| Chicago, del. | 2.98c |
| Philadelphia, del. | 3.14c |
| New York, del. | 3.18c |
| Birmingham, base | 3.00c |
| St. Louis, del. | 3.17c |
| San Francisco, f.o.b. cars, dock | 3.55c |

TIN MILL BLACK No. 28

| | |
|---|---|
| Pittsburgh, base | 2.65c |
| Gary, base | 2.75c |
| St. Louis, del. | 2.97c |

COLD ROLLED No. 10

| | |
|---|---|
| Pittsburgh, base | 2.30c |
| Gary, base | 2.40c |
| Detroit, delivered | 2.50c |
| Philadelphia, del. | 2.59c |
| New York, del. | 2.63c |

COLD ROLLED No. 20

| | |
|---|---|
| Pittsburgh, base | 2.75c |
| Gary, base | 2.85c |
| Detroit, delivered | 2.95c |
| Philadelphia, del. | 3.04c |
| New York, del. | 3.08c |

ENAMELING SHEETS

| | |
|---|---|
| Pittsburgh, No. 10 | 2.45c |
| Pittsburgh, No. 20 | 2.90c |

## Tin and Terne Plate

Per 100-lb. box, Pittsburgh. Gary base, 10 cents higher

| | |
|---|---|
| Tin plate, coke base contract | $5.25 |
| Do., stock | 4.55 |
| Long ternes, No. 24 unassorted | 3.25c |

## Corrosion and Heat Resistant Alloys

Base, Pittsburgh

18% chrome, 8% nickel; sheets, 35c; plates, 28c; bars, 24c; hot-rolled strip, 24.50c; cold-rolled strip, 32.00c.

| | A | B | C | D |
|---|---|---|---|---|
| Bars | 17c | 18.5c | 21c | 26c |
| Plates | 20c | 21.5c | 24c | 29c |
| Sheets | 25c | 28c | 31c | 35c |
| Hot strip | 17c | 18.5c | 21c | 26c |
| Cold strip | 22.5c | 24c | 27c | 35c |

Carbon 0.12 and under; no nickel. A has chrome 15% and under. B over 15/18% inc., C over 19/23% inc., D over 23/30%.

## Steel Plates

| | |
|---|---|
| Pittsburgh, base | 1.70c |
| New York, del. | 1.98c |
| Philadelphia, del. | 1.88½c |
| Boston, del. | 2.10c |
| Buffalo, del. | 1.93½c |
| Chicago, base | 1.75c |
| Cleveland, del. | 1.88½c |
| Birmingham, base | 1.85c |
| Coatesville, base | 1.80c |
| Sparrows Pt., base | 1.80c |
| Pacific Coast, f.o.b. cars, dock | 2.25c |
| St. Louis, del. | 1.97c |

## Structural Shapes

| | |
|---|---|
| Pittsburgh, base | 1.70c |
| Philadelphia, del. | 1.90½c |
| New York, del. | 1.95½c |
| Boston, del. | 2.08½c |
| Bethlehem, base | 1.80c |
| Chicago, base | 1.75c |
| Cleveland, del. | 1.88½c |
| Buffalo, base | 1.80c |
| Birmingham, base | 1.85c |
| Pacific Coast, f.o.b. cars, dock | 2.25c |

## Bars

SOFT STEEL

| | |
|---|---|
| Pittsburgh, base | 1.75c |
| Chicago, base | 1.80c |
| Birmingham, base | 1.90c |
| Buffalo, base | 1.85c |
| Cleveland, base | 1.80c |
| Detroit, del. | 1.90c |
| Pacific Coast ports, cars, dock, c.i.f. | 2.30c |
| Philadelphia, del. | 2.04c |
| Boston, del. | 2.15c |
| New York, del. | 2.08c |
| Pitts., forg. qual. | 1.75c-2.25c |

RAIL STEEL
To Manufacturing Trade

| | |
|---|---|
| Pittsburgh | 1.65c |
| Chicago | 1.70c |
| Cleveland | 1.70c |
| Gary, Ind. | 1.70c |
| Buffalo | 1.75c |

IRON

| | |
|---|---|
| Terre Haute, Ind. base | 1.60c |
| Philadelphia, base | 1.74c |
| Pittsburgh, refined | 2.75c-7.50c |

REINFORCING
New billet, cut lengths, carlots

| | |
|---|---|
| Pittsburgh | 1.90c |
| Chicago, Gary, Buffalo, Cleve., Birm., Young | 1.95c |
| Gulf ports | 2.30c |
| Pacific coast ports | 2.45c |
| Philadelphia, del. | 2.19c |

Rail Steel

| | |
|---|---|
| Pittsburgh, base | 1.75c |
| Chicago, Buffalo, Cleveland, Birm., Young. | 1.80c |
| Gulf ports | 2.15c |
| Pacific coast ports | 2.30c |

## Wire Products □ □

(Prices apply to straight or mixed carloads; pool cars, or less, 10c up. 10% dis. on nail extras on straight or mixed carloads to one consignee.)

Base, Pittsburgh-Cleveland
(Per 100-lb. keg)

| | |
|---|---|
| Standard wire nails | $2.35 |
| Cement coated nails | 2.35 |
| Galvanized nails, 15 gage and coarser | 4.35c |
| Do., 16 gage and finer | 4.85c |

(Per pound)

| | |
|---|---|
| Polished staples | 3.05c |
| Galvanized fence staples | 3.30c |
| Barbed wire, galv. | 2.85c |
| Annealed fence wire | 2.35c |
| Galvanized fence wire | 2.70c |
| Woven wire fencing (base column, c.l.) | $60.00 |
| Plain wire, 6-9 gage to mfg. trade | 2.20c |

Anderson, Ind., Chicago up $1; Duluth up $2; Birmingham up $3.

| | |
|---|---|
| Spring wire | 3.20c |

Chicago and Waukegan $1 higher, Worcester $2 higher.

## Cold-Finished Carbon Bars

Base Pitts., one size, shape, grade, shipment at one time to one destination

| | |
|---|---|
| 10,000 to 19,999 lbs. | 2.10c |
| 20,000 to 59,999 lbs. | 2.05c |
| 60,000 to 99,999 lbs. | 2.00c |
| 100,000 lbs. and over | 1.97½c |

Chicago, Cleveland, up 5c; Buffalo, up 10c; Detroit, up 20c; eastern Michigan, up 25c.

## Shafting □ □ □

| | |
|---|---|
| Turned and ground, Pitts. base | |
| 1⅛-inch | 3.40c |
| 1 3/16 to 1½-inch | 2.90c |
| 1 9/16 to 1⅞-inch | 2.75c |
| 1 15/16 to 2⅞-inch | 2.60c |
| 2 15/16 to 7-inch | 2.45c |

## Alloy Steel Bars □

Hot Rolled

| | |
|---|---|
| Pittsburgh, Buffalo, Chicago, Massillon, Canton | 2.45c |
| Bethlehem | 2.55c |

| Alloy S.A.E. | Diff. | Alloy S.A.E. | Diff. |
|---|---|---|---|
| 2000 | 0.25 | 3100 | 0.55 |
| 2100 | 0.55 | 3200 | 1.35 |
| 2300 | 1.50 | 3300 | 3.80 |
| 2500 | 2.25 | 3400 | 3.20 |

| | |
|---|---|
| 4100 .15 to .25 Mo | 0.50 |
| 4600 .20 to .30 Mo. 125-1.75 Ni. | 1.05 |
| 5100 .80-1.10 Cr | 0.45 |
| 5100 Cr. spring | base |
| 6100 bars | 1.20 |
| 6100 spring | 0.70 |
| Cr., Ni., Van | 1.50 |
| Carbon van. | 0.95 |
| 9250.....carbon base plus extras | |

## Strip and Hoops □

| | |
|---|---|
| Hot strip to 23 1/8-in. Pittsburgh | 1.75c |
| Do., Chicago | 1.85c |
| Do., del. Detroit | 1.95c |
| Do., del. Phila | 2.04c |
| Do., del. N. Y. | 2.08c |
| Cooperage hoop, Pittsburgh | 1.85c |
| Do., Chicago | 1.95c |
| Cold-rolled strip, Pitts., Cleve. | 2.40c |
| Worcester | 2.60c |

## Rails, Track Material □

(Gross Ton)

| | |
|---|---|
| Standard rails, mill | $36.37½ |
| Relay rails. Pitts. 20-45 lbs. | $26.00 |
| 50-60 lbs. | $23.00 |
| 70-75 lbs. | $18.00 |
| 80-85 lbs. | $25.00 |
| 100 lbs. | $26.00 |
| Light rails, billet qual., Pitts., Chi. | $32.00 |
| Do., reroll. qual. | $31.00 |
| Angle bars, mills | 2.55c |
| Spikes, R. R. base | 2.40c |
| Track bolts, base | 3.55c |
| Tie plates, base | 1.90c |

Base, light rails 25 to 40 lbs.; 50 to 60 lbs. inclusive up $5; 16 and 20 lbs., up $1; 12 lbs., up $2; 8 and 10 lbs., up $5. Base railroad spikes 200 kegs or more; base tie plates 20 tons or more; diff. for less.

## Bolts and Nuts □ □

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade for all case lots. Dec. 1, 1932, lists.

CARRIAGE BOLTS

| | |
|---|---|
| All sizes, cut thread | 70 off |
| Rolled thread, ½ x 6 and smaller | 70 off |

MACHINE BOLTS

| | |
|---|---|
| All sizes, cut thread, lag Screws, plow bolts, Nos. 1-2-3-7 heads, tap bolts, blank bolts, stud bolts, without nuts | 70 off |
| Tire bolts | 60 off |
| Stove bolts, 70-25-10 off in pkgs.; 83 off in bulk, 5000 or more of a size. | |
| Rolled thread machine bolts, ½ x 6 and smaller, | 70 off |
| Step bolts | 66 off |
| Elevator bolts | 66 off |

NUTS

| | |
|---|---|
| Semifinished | 70 off |

HEXAGON CAP SCREWS

| | |
|---|---|
| Milled | 80-10-10 off |
| Upset 1-in., smaller | 85 off |

SQUARE HEAD SET Screws

| | |
|---|---|
| Upset, 1-in., smaller | 75-10 off |
| Upset, larger than 1-in. | 75-10 off |
| Headless set screws | 75 off |

## Rivets, Wrought Washers

| | |
|---|---|
| Struc., c.l., Pittsburgh, Cleveland | 2.75c |
| Struc., c.l., Chicago | 2.85c |
| ⅞-in. and smaller, Pitts., Chi., Cleve. | 70 and 10 off |
| Wrought washers, Pitts., Chi., Phila. | 6.00-6.25 off |

## Cut Nails, Piling □

| | |
|---|---|
| Cut nails, Pitts:; (10% discount on size extras) | $2.75 |
| Do. less carloads, 5 kegs or more; no discount on size extras | $3.05 |
| Do., less than 5 kegs; no discount on size extras | $3.20 |
| Steel piling, Pittsburgh | 2.00c |
| Steel piling, Chi., Buff | 2.10c |

## Pipe and Tubing

Base $200 net ton, except on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.

## Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less. Chicago delivered 2½ points less. Wrought pipe, Pittsburgh base.

BUTT WELD

| In. | Blk. | Gal. |
|---|---|---|
| Steel | | |
| ¼ and ⅜ | 57 | 38½ |
| ½ | 62 | 50½ |
| ¾ | 65½ | 55½ |
| 1—3 | 67½ | 58½ |
| Iron | | |
| ½ | 31½ | 15 |
| ¾ | 36½ | 20½ |
| 1—1¼ | 39½ | 25½ |
| 2 | 41½ | 26 |

LAP WELD

| | | |
|---|---|---|
| Steel | | |
| 2 | 63½ | 54½ |
| 2½—3 | 66½ | 57½ |
| 3½—6 | 68½ | 59½ |
| 7 and 8 | 67½ | 57½ |
| 9 and 10 | 67 | 57 |
| Iron | | |
| 2 | 37 | 22½ |
| 2½—3½ | 38 | 25 |
| 4—8 | 40 | 28½ |

LINE PIPE

| | |
|---|---|
| Steel | |
| ⅛-inch, butt weld | 50½ |
| ¼—⅜, butt weld | 56 |
| ½, butt weld | 61 |
| ¾, butt weld | 64½ |
| 1—3, butt weld | 66½ |
| 2-inch, lap weld | 62½ |
| 2½—3, lap weld | 65½ |
| 3½—6, lap weld | 67½ |
| 7—8, lap weld | 66½ |
| Iron | |
| ⅛—1½-inch, black and galv. | take 4 pts. over; 2½—6-inch 2 pts. over discounts for same sizes, standard pipe lists. 8—12-inch, no extra. |

BOILER TUBES

*C. L. Discounts, f.o.b. Pitts.*

| Lap Weld Steel | | Charcoal Iron | |
|---|---|---|---|
| 2—2¼ | 33 | 1¾ | 8 |
| 2½—2¾ | 40 | 2—2¼ | 13 |
| 3 | 47 | 2½—2¾ | 16 |
| 3¼—3½ | 50 | 3 | 17 |
| 4 | 52 | 3¾—3½ | 18 |
| 4½—5 | 42 | 4 | 20 |
| | | 4½ | 21 |

In lots of a carload or more, above discounts subject to preferential of two 5% and one 7½% discount on steel and 10% on charcoal iron.

Lapwelded steel: 2000 to 9999 pounds, ten points under base, one 5% and one 7½%. Under 2000 pounds 15 points under base, one 5% and one 7½%. Charcoal iron: 10,000 pounds to carloads, base less 5%; under 10,000 pounds, two points under base only.

SEAMLESS BOILER TUBES

| Cold Drawn | | | |
|---|---|---|---|
| 2—2¼ | 27 | 3¼—3½ | 41 |
| 2½—2¾ | 34 | 4 | 43 |
| 3 | 38 | 4½, 5, 6 | 36 |

(On 1—1¾-inch sizes mechanical tubing dis. apply.)

| Hot Rolled | | | |
|---|---|---|---|
| 2—2¼ | 33 | 3¼—3½ | 47 |
| 2½—2¾ | 40 | 4 | 49 |
| 3 | 44 | 4½, 5, 6 | 42 |

Quantity discounts: Carload and more gets preferential of two 5%; 2000 to 9999 pounds, 10 points off base and one 5%; under 2000 pounds, 15 points under base and one 5%.

## Seamless Tubing □

*Cold drawn; f.o.b. mill disc.*

| | |
|---|---|
| 100 ft. or 150 lbs. | 32% |
| 15,000 ft. or 22,500 lbs. | 70% |

## Cast Iron Water Pipe □

*Class B Pipe—Pet Net Ton*

| | |
|---|---|
| 6-in., & over, Birm. | $36.00-37.00 |
| 4-in., Birm. | 39.00-40.00 |
| 4-in., Chicago | 47.00-48.00 |
| 6 to 24-in., Chicago | 44.00-45.00 |
| 6-in., & over, east. fdy. | 40.00 |
| Do., 4-in. | 43.00 |

Class A pipe $3 over Class B. Stnd. fitgs., Birm. base....$90.00

Six to 24-inch, fittings base; over 24-inch plus $20; 4-inch, plus $10; 3-inch, plus $20; gas pipe fittings, 5 higher.

## Semifinished Steel □

*Prices Per Gross Ton*

BILLETS AND BLOOMS
*4 x 4-inch base*

| | |
|---|---|
| Pitts., Chi., Cleve., open-hth. & bess. | $26.00 |
| Philadelphia | 31.30 |
| Forgings, Pitts., Chi. | 31.00 |

SHEET BARS

| | |
|---|---|
| Pitts.,Cleve., Young. | 26.00 |
| Chicago | 26.00 |
| Canton, O. | 26.00 |

SLABS

| | |
|---|---|
| Pitts.,Cleve., Young. | 26.00 |

WIRE RODS

| | |
|---|---|
| Pitts., Cleveland | 36.00 |
| Chicago | 37.00 |

SKELP

| | |
|---|---|
| All grades, Pitts., and Chicago | 1.60c |

## Coke □ □ □

*Price Per Net Ton*

BEEHIVE OVENS

| | |
|---|---|
| *Connellsville fur. | $3.25- 3.50 |
| Connellsville fdry. | 4.25 |
| *Connel. prem. fdy. | 5.00 |
| New River fdry. | 6.00 |
| Wise county fdry. | 4.25- 5.00 |
| Wise county fur. | 3.50- 4.25 |

BY-PRODUCT FOUNDRY

| | |
|---|---|
| Newark, N. J., del. | 8.71- 9.31 |
| Chi., ov., outside del. | 8.50 |
| Chicago, del | 9.25 |
| New England, del. | 10.50 |
| St. Louis, del. | 9.25 |
| Birmingham, ovens | 5.00 |
| Indianapolis, del. | 8.75 |
| Cincinnati, del. | 9.30 |
| Cleveland, del. | 9.25 |
| Buffalo, ovens | 7.50- 8.00 |
| Detroit, ovens | 8.00 |
| Philadelphia, del. | 9.00 |

## Coke By-Products □

Per gallon, producers' plants.

Tank lots

| | Spot |
|---|---|
| Pure benzol | $0.205 |
| 90 per cent benzol | $0.205 |
| Toluol | 0.30 |
| Solvent naphtha | 0.26 |
| Commercial xylol | 0.26 |

Per lb. f.o.b. New York

| | |
|---|---|
| Phenol (200 lb. drums) | 0.163c |
| * Do. (100 lb.) | 0.173 |

Eastern Plants, Per Pound, In Barrels

| | |
|---|---|
| †*Naphthalene flakes and balls | 6.00 |

Per 100 lb. Atlantic seaboard

| | |
|---|---|
| Sulphate of ammonia | $1.25 |

†Western prices ½-cent higher per pound.

## Pig Iron

Delivered prices do not include switching charges except as noted. No. 2 foundry iron is 1.75-2.25 silicon; 25-cent differentials apply for each 0.25 silicon above 2.25. Gross tons.

| | No. 2 Fdry. | Malleable | Basic | Bessemer |
|---|---|---|---|---|
| Basing Points: | | | | |
| Bethlehem, Pa. | $18.50 | $19.00 | $18.00 | $19.50 |
| Birdsboro, Pa. | 18.50 | 19.00 | 18.00 | 19.50 |
| Swedeland, Pa. | 18.50 | 19.00 | 18.00 | 19.50 |
| Sparrows Point, Md. | 18.50 | ..... | 18.00 | ..... |
| From Swedeland, Pa., del. to Philadelphia | 19.26 | 19.76 | 18.76 | ..... |
| From Bethlehem, del. to Brooklyn | 20.77 | 21.27 | ..... | ..... |
| From Bethlehem, del. to Newark, N. J. | 19.99 | 20.39 | ..... | ..... |
| Basing Point: | | | | |
| Everett, Mass. | 18.50 | 19.00 | 18.00 | 19.50 |
| From Everett, del. to Boston | 19.00 | 19.50 | 18.50 | 20.00 |
| Basing Point: | | | | |
| Buffalo | 17.50 | 18.00 | 16.50 | 18.50 |
| From Buffalo, del. to Boston | 19.00 | 19.50 | 18.50 | 20.00 |
| Basing Points: | | | | |
| Neville Island, Pa. | 18.00 | 18.00 | 17.00 | 18.50 |
| Sharpsville, Pa. | 17.50 | 17.50 | 17.00 | 18.00 |
| Youngstown, O. | 17.50 | 17.50 | 17.00 | 18.00 |
| From Neville Island, Pa., del. to Pittsburgh district | (Neville Island base, plus 63c to $1.13 switching charges) | | | |
| Basing Points: | | | | |
| Erie, Pa. | 17.50 | 18.00 | 17.00 | 18.50 |
| Cleveland | 17.50 | 17.50 | 17.00 | 18.00 |
| Toledo, O. | 17.50 | 17.50 | 17.00 | 18.00 |
| Detroit | 17.50 | 17.50 | 17.00 | 18.00 |
| From Detroit, del. to Saginaw, Mich. | 19.60 | 19.60 | 19.10 | 20.10 |
| From Cleveland, del. to Akron, Canton, O. | 18.76 | 18.76 | 18.26 | 19.26 |
| From Toledo, del. to Mansfield, O. | 19.26 | 19.26 | 18.76 | 19.76 |
| Basing Point: | | | | |
| Jackson, O. | 19.25 | 19.25 | 18.75 | ..... |
| Hamilton, O. | 17.50 | 17.50 | 17.00 | 18.00 |
| From Hamilton, del. to Cincinnati | 18.51 | 18.51 | 18.01 | 19.01 |
| Do., del. to Indianapolis | 19.77 | 19.77 | 19.27 | 20.27 |
| Basing Points: | | | | |
| Duluth | 18.00 | 18.00 | ..... | 18.50 |
| Chicago | 17.50 | 17.50 | 17.00 | 18.00 |
| Granite City, Ill. | 17.50 | 18.00 | 17.00 | ..... |
| From Duluth, del. to St. Paul | 19.94 | 19.94 | ..... | 20.44 |
| From Chicago, del. to Milwaukee | 18.50 | 18.50 | 18.00 | 19.00 |
| From Chicago, Toledo or Detroit, del. to Muskegon, Mich. | 20.40 | 20.40 | 19.90 | 20.90 |
| From Granite City, del. to St. Louis | 18.00 | 18.50 | 17.50 | ..... |
| Basing Point: | | | | |
| †Birmingham, Ala. | 13.50 | ..... | 12.50 | 18.00 |
| From Birmingham, del. to: | | | | |
| Boston | 18.62 | ..... | 18.12 | ..... |
| Newark, N. J. | 19.58 | ..... | ..... | ..... |
| Brooklyn, N. Y. | 20.39 | ..... | ..... | ..... |
| Baltimore | 19.02 | ..... | 18.52 | ..... |
| Philadelphia | 18.88 | ..... | 18.38 | ..... |
| Cleveland | 17.62 | ..... | 17.50 | ..... |
| Cincinnati | 18.13 | ..... | 17.51 | ..... |
| Chicago | *17.72 | ..... | 17.60 | ..... |
| St. Louis | 17.62 | ..... | 17.50 | ..... |

†Southern delivery only. Prices at northern points are adjusted to quotations on northern iron. *Over 0.70 phos.

| | |
|---|---|
| Basing Point: | |
| Provo, Utah | 16.50 ..... ..... ..... |

LOW PHOS.

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.—$23.00. Basing point: †Johnson City, Tenn.—$19.00 †Quoted on material in stock.

Philadelphia, standard and copper bearing..... 24.13

| GRAY FORGE | | CHARCOAL | |
|---|---|---|---|
| Valley furnace | 17.25 | Lake Superior fur. | 20.50 |
| Pitts. dist. fur. | 17.75 | Do., del. Chicago | 23.54 |

SILVERY

Jackson county, O., base; 6%—$22.25; 7—$23.25; 8—$24.25; 9—$25.25; 10—$26.25; 11—$27.75.

BESSEMER FERROSILICON

Jackson County, O., base; 10%—$27.25; 11—$28.75; 12—$30.25; 13—$31.75; 14—$33.25; 15—$34.75; 16—$36.25.

## Iron Ore

LAKE SUPERIOR ORE

*Gross ton, 51½%*

*Lower Lake Ports*

| | |
|---|---|
| Old range bessemer | $4.80 |
| Mesabi bessemer | 4.65 |
| Old range nonbess. | 4.65 |
| Mesabi nonbess. | 4.50 |
| High phosphorus | 4.40 |

EASTERN LOCAL ORES

*Cents, unit, del. E. Pa.*

| | |
|---|---|
| Foundry and basic, 56-63% con. (nom.) | 8.00- 9.00 |
| Cop.-free low phos. 58-65% (nom.) | 10.00-10.50 |

FOREIGN ORE

*Cents per unit, f.a.s. Atlantic ports (nominal)*

| | |
|---|---|
| Foreign manganiferous ore, 45.55% iron, 6-10% man. | 10.00 |
| No. Afr. & low phos. | 9.50 |
| Swedish basic, 65% | 9.00 |
| Swedish low phos. | 9.50 |
| Spanish No. Africa basic, 50 to 60% | 9.00 |
| Tungsten, spot, sh. ton unit, duty pd. | $14.00-14.25 |
| N. F. fdy., 55% | 7.00 |
| Chrome ore 48% gross ton, c.i.f. | $18.00 |

## Manganese Ore

*(Nominal)*

Prices, not including duty, cents per unit, cargo lots.

| | |
|---|---|
| Caucasian, 52-55% | 24.00 |
| So. African, 52% | 24.00 |
| So. Afr., 49-51% | 22.00 |
| Indian, 58-50% | nominal |
| Indian, 48-50% | nominal |

## Refractories

*Per 1000 f.o.b. Works*

FIRE CLAY BRICK

*First Quality*

| | |
|---|---|
| Pa., Ohio, Ill., Ky., Md., Ga., Mo. | $45.00 |
| Alabama | 48.00 |

*Second Quality*

| | |
|---|---|
| Pa., Ohio, Ill., Ky., Md., Mo., Ga., Ala. | 40.00 |

| | |
|---|---|
| MALLEABLE BUNG BRICK all bases | 50.00 |

SILICA BRICK

| | |
|---|---|
| Pennsylvania | $45.00 |
| Joliet, E. Chicago | 54.00 |
| Birmingham, Ala. | 52.00 |

MAGNESITE

| | |
|---|---|
| Dead burned grain, Chester, Pa., Baltimore bases, net | 40.00 |
| Domes, Chewelah, Wash., base | 22.00 |

BASIC BRICK

*Net ton, f.o.b. Baltimore, Plymouth, Meeting, Pa., Chester, Pa.*

| | |
|---|---|
| Magnesite brick | $65.00 |
| Chrome brick | 45.00 |
| Chemically bonded magnesite | 55.00 |

## Fluorspar 85-5

| | |
|---|---|
| Washed gravel, duty paid, tide, gross ton | $21.00 |
| Washed gravel, f.o.b. Ill., Ky., net ton, carloads | $14.75-15.00 |

## Ferroalloys

*Dollars, except Ferrochrome*

| | |
|---|---|
| Ferromanganese, 78-82% tidewater, duty paid | 85.00 |
| del. Pittsburgh | 90.24 |
| Spiegeleisen, 19-20%, dom., fur., spot† | 26.00 |
| Ferrosilicon, 50%, freight all., cl. | 77.50 |
| Do., less carload | 85.00 |
| Do., 75 per cent. Spot, $5 a ton higher. | 126-130.00 |
| Silicomang., 2½ carb | 90.00 |
| 2% carbon | 95.00 |
| 1% carbon | 105.00 |
| Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. con. del. | 10.00 |
| Ferrotungsten, stand., lb. cont. | 1.16- 1.25 |
| Ferrovanadium, 35 to 40%, lb. cont., on analysis | 2.70- 2.90 |
| Ferrotitanium, c. l., prod. plant, frt. allow., net ton | 137.50 |
| Spot, 1 ton, frt., allow., lb. | 7.00 |
| Do., under 1 ton | 7.50 |
| Ferrophosphorus, per ton, c. l., 17-19%, Rockdale, Tenn., basis, 18%, $2 unitage | 50.00 |
| Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% $2.75 unitage | 65.00 |
| Ferromolybdenum, stand. 50-60%, lb. | 0.95 |
| Molybdate, lb. cont. | 0.80 |

†Carloads. Quan. diff. apply.

## Nonferrous Mill Products

*F.o.b. mill base, cents per lb. except as specified. Copper, brass products based on 8.25c Conn. copper*

| | |
|---|---|
| **Sheets** | |
| Yellow brass (high) | 13.75 |
| Copper, hot rolled | 15.00 |
| Lead, cut, to jobbers | 7.75 |
| Zinc, 100-lb. base | 9.00 |
| **Tubes and Pipes** | |
| High yellow brass | 16.25 |
| Seamless copper | 16.25 |
| **Rods** | |
| High yellow brass | 12.25 |
| Copper, hot rolled | 12.25 |
| **Anodes** | |
| Copper, untrimmed | 12.75 |
| **Wire** | |
| Yellow brass (high) | 14.25 |

## Old Metals

*Deal. buying prices, cents lb.*

| | |
|---|---|
| **No. 1 Composition Red Brass** | |
| New York | 4.50- 4.75 |
| Chicago | 4.37½-4.87½ |
| Cleveland | 5.00- 5.25 |
| St. Louis | 4.75- 5.00 |
| **Heavy Copper and Wire** | |
| New York | 6.12½- 6.25 |
| Chicago, No. 1 | 5.75- 6.00 |
| Cleveland | 5.50- 5.75 |
| St. Louis | 5.75- 6.00 |
| **Composition Brass Borings** | |
| New York | 4.25- 4.50 |
| **Light Copper** | |
| New York | 5.25- 5.50 |
| Chicago | 4.50- 4.75 |
| Cleveland | 5.00- 5.25 |
| St. Louis | 4.75- 5.00 |
| **Light Brass** | |
| Chicago | 2.50- 2.75 |
| Cleveland | 3.00- 3.25 |
| **Lead** | |
| New York | 3.00- 3.25 |
| Cleveland | 3.00- 3.25 |
| Chicago | 2.75- 3.00 |
| St. Louis | 3.10- 3.25 |
| **Zinc** | |
| New York | 2.25- 2.50 |
| *Cleveland | 2.25- 2.65 |
| Chicago | 2.25- 2.50 |
| St. Louis | 2.75- 3.00 |
| **Aluminum** | |
| *Clips, soft, Cleve. | 13.00-14.00 |
| *Borings, Cleveland | 6.75- 7.25 |
| *Mixed, cast, Cleve. | 11.00-11.25 |
| *Mixed, cast, St. L. | 11.75-12.25 |

## Secondary Metals

| | |
|---|---|
| *Brass ingot, 85-5-5-5 | 8.25 |
| Remelt al. No. 12 | 15.50-16.00 |

# Iron and Steel Scrap Prices

*Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated*

**HEAVY MELTING STEEL**

| | |
|---|---|
| Birmingham | 9.50-10.50 |
| Boston, dealers | 8.00- 8.25 |
| Buffalo, No. 1 | 12.75-13.25 |
| Buffalo, No. 2 | 11.25-11.75 |
| Chicago | 12.00-12.50 |
| Cleveland, No. 1 | 12.00-12.50 |
| Cleveland, No. 2 | 11.50-12.00 |
| Detroit, No. 1 | 10.00-10.50 |
| Detroit, No. 2 | 9.00- 9.50 |
| Eastern Pa. | 11.50-12.00 |
| Eastern Pa., No. 2 | 9.50-10.00 |
| Federal, Ill. | 9.25- 9.75 |
| Granite City, Ill. | 9.50-10.00 |
| N. Y., deal. R. R. | 9.50 |
| N. Y., deal. No. 2 | 8.00 |
| Pittsburgh, No. 1 | 14.25-14.75 |
| St. Louis, No. 1 del. | 10.00-10.50 |
| Valleys, No. 1 | 14.50-15.00 |

**COMPRESSED SHEETS**

| | |
|---|---|
| Buffalo, dealers | 11.25-11.75 |
| Chicago, factory | 11.00-11.50 |
| Cleveland | 11.00-11.50 |
| Detroit | 10.50-11.00 |
| E. Pa., new mat. | 10.50 |
| Pittsburgh | 14.00-14.50 |
| St. Louis | 8.00- 8.50 |
| Valleys | 14.00-14.50 |

**BUNDLED SHEETS**

| | |
|---|---|
| Buffalo | 7.50- 8.00 |
| Cincinnati, del. | 7.50- 8.00 |
| Cleveland | 8.50- 9.00 |
| Pittsburgh | 13.00-13.50 |
| St. Louis | 6.50- 7.00 |

**SHEET CLIPPINGS LOOSE**

| | |
|---|---|
| Chicago | 6.50- 7.00 |
| Cincinnati | 7.00- 7.50 |
| Detroit | 7.50- 8.00 |
| St. Louis | 6.00- 6.50 |

**STEEL RAILS, SHORT**

| | |
|---|---|
| Birmingham | 12.00-12.50 |
| Boston, dealers | 7.75- 8.00 |
| Buffalo | 13.75-14.25 |
| Chicago (3 ft.) | 12.50-13.00 |
| Chicago (2 ft.) | 13.50-14.00 |
| Cincinnati, del. | 13.00-13.50 |
| Detroit | 11.50-12.00 |
| Pitts., (open-hearth 3 ft. and less | 16.00-16.50 |
| St. Louis | 12.50-13.00 |

**STOVE PLATE**

| | |
|---|---|
| Birmingham | 6.50- 7.50 |
| Boston, dealers | 4.75- 5.00 |
| Buffalo | 10.75-11.25 |
| Chicago, net | 7.75- 8.25 |
| Cincinnati, dealers | 7.00- 7.50 |
| Detroit, net | 7.50- 8.00 |
| Eastern Pa. | 8.50- 9.00 |
| N. Y., deal. fdry. | 6.00 |
| St. Louis | 6.50- 7.00 |

**COUPLERS, SPRINGS**

| | |
|---|---|
| Buffalo | 13.00-14.00 |
| Chicago, springs | 13.00-13.50 |
| Eastern Pa. | 15.50 |
| Pittsburgh | 16.25-16.75 |
| St. Louis | 12.00-12.50 |

**ANGLE BARS—STEEL**

| | |
|---|---|
| Chicago | 12.50-13.00 |
| St. Louis | 10.00-10.50 |

**LOW PHOSPHORUS**

| | |
|---|---|
| Buffalo, billets and bloom crops | 13.75-14.25 |
| Cleveland, billet, bloom crops | 14.00-14.50 |
| Eastern Pa. crops | 14.00-14.50 |
| Pittsburgh, billet, bloom crops | 17.00-17.50 |
| Pittsburgh, sheet bar crops | 16.00-16.50 |

**FROGS, SWITCHES**

| | |
|---|---|
| Chicago | 12.00-12.50 |
| St. Louis | 9.50-10.00 |

**SHOVELING STEEL**

| | |
|---|---|
| Chicago | 12.00-12.50 |
| St. Louis | 9.25- 9.75 |

**RAILROAD WROUGHT**

| | |
|---|---|
| Birmingham | 7.00- 8.00 |
| Boston, dealers | 6.00- 6.50 |
| Buffalo, No. 1 | 9.75-10.25 |
| Buffalo, No. 2 | 12.75-13.25 |
| Chicago, No. 1, net | 9.50-10.00 |
| Chicago, No. 2 | 11.75-12.25 |
| Cincinnati, No. 2 | 10.00-10.50 |
| Eastern Pa. | 12.50-13.00 |
| N. Y., No. 1 deal | 8.00- 8.50 |
| St. Louis, No. 1 | 6.00- 6.50 |
| St. Louis, No. 2 | 9.50-10.00 |

**SPECIFICATION PIPE**

| | |
|---|---|
| Boston | 4.50- 4.75 |
| Eastern Pa. | 9.50-10.00 |
| New York, dealers | 5.25- 5.50 |

**BUSHELING**

| | |
|---|---|
| Buffalo, No. 1 | 11.25-11.75 |
| Chicago, No. 1 | 10.75-11.00 |
| Cinci., No. 1 deal | 6.50- 7.00 |
| Cincinnati, No. 2 | 4.50- 5.00 |
| Cleveland, No. 2 | 9.00- 9.50 |
| Detroit, No. 1 new | 9.00- 9.50 |
| St. Louis, No. 1 | 7.00- 7.50 |
| Valleys, new No. 1 | 14.00-14.50 |

**MACHINE TURNINGS**

| | |
|---|---|
| Bimingham | 4.50- 5.00 |
| Boston, dealers | 4.75- 5.00 |
| Buffalo | 7.25- 7.75 |
| Chicago | 7.50- 8.00 |
| Cincinnati, dealers | 6.00- 6.50 |
| Cleveland | 9.00- 9.50 |
| Detroit | 7.00- 7.50 |
| Eastern Pa. | 7.50 |
| New York, dealers | 3.25- 3.50 |
| Pittsburgh | 10.75-11.25 |
| St. Louis | 5.25- 5.75 |
| Valleys | 12.00-12.50 |

**BORINGS AND TURNINGS**

*For Blast Furnace Use*

| | |
|---|---|
| Boston, dealers | 3.25- 3.50 |
| Buffalo | 7.75- 8.25 |
| Cincinnati, dealers | 6.00- 6.50 |
| Cleveland | 9.00- 9.50 |
| Detroit | 8.00- 8.50 |
| Eastern Pa. | 6.50 |
| New York, dealers | 2.00- 2.50 |
| Pittsburgh | 9.00- 9.50 |

**CAST IRON BORINGS**

| | |
|---|---|
| Birmingham, plain | 4.50- 5.00 |
| Boston, chemical | 8.50- 9.00 |
| Boston, dealers | 3.25- 3.50 |
| Buffalo | 7.50- 8.00 |
| Chicago | 7.75- 8.25 |
| Cincinnati, dealers | 6.00- 6.50 |
| Cleveland | 9.00- 9.50 |
| Detroit | 8.00- 8.50 |
| E. Pa., chemical | 12.00-15.00 |
| New York, dealers | 3.00- 3.50 |
| Pittsburgh | 9.00- 9.50 |
| St. Louis | 5.25- 5.75 |

**PIPE AND FLUES**

| | |
|---|---|
| Cincinnati, dealers | 4.50- 5.00 |

**RAILROAD GRATE BARS**

| | |
|---|---|
| Buffalo | 7.00- 7.50 |
| Chicago, net | 7.50- 8.00 |
| Cincinnati | 6.00- 6.50 |
| Eastern Pa. | 8.50- 9.00 |
| New York, dealers | 5.00- 5.50 |
| St. Louis | 6.00- 6.50 |

**FORGE FLASHINGS**

| | |
|---|---|
| Boston, dealers | 6.00- 6.50 |
| Buffalo | 11.25-11.75 |
| Cleve., over 10 in. | 9.25- 9.75 |
| Detroit | 8.75- 9.25 |

**FORGE SCRAP**

| | |
|---|---|
| Boston, dealers | 5.00- 6.00 |
| Chicago, heavy | 12.50-13.00 |
| Eastern Pa. | 10.50-11.00 |

**ARCH BARS, TRANSOMS**

| | |
|---|---|
| St. Louis | 10.50-11.00 |

**AXLE TURNINGS**

| | |
|---|---|
| Boston, dealers | 4.50- 5.00 |
| Buffalo | 9.00- 9.50 |
| Chicago, elec. fur | 10.50-11.00 |
| Cleveland | 9.50-10.00 |
| Eastern Pa. | 11.00 |
| St. Louis | 6.00- 6.50 |

**STEEL CAR AXLES**

| | |
|---|---|
| Birmingham | 11.00-11.50 |
| Boston, ship. point. | 8.00- 8.50 |
| Buffalo | 13.00 13.50 |
| Chicago, net | 12.50-13.00 |
| Eastern Pa. | 14.00 |
| St. Louis | 10.50-11.00 |

**SHAFTING**

| | |
|---|---|
| Boston, ship. point. | 11.00-11.25 |
| Eastern Pa. | 16.50 |
| New York, dealers | 11.50-12.00 |
| St. Louis | 10.00-10.50 |

**CAR WHEELS**

| | |
|---|---|
| Birmingham, iron | 9.00- 9.50 |
| Boston, iron deal | 6.50- 6.75 |
| Buffalo, iron | 12.25-12.75 |
| Buffalo, steel | 13.25-13.75 |
| Chicago, iron | 12.25-12.75 |
| Chicago, rolled steel | 12.50-13.00 |
| Cincinnati, iron | 10.25-10.50 |
| Eastern Pa., iron | 13.50-14.00 |
| Eastern Pa., steel | 15.00-15.50 |
| Pittsburgh, iron | 13.00-13.50 |
| Pittsburgh, steel | 16.25-16.75 |
| St. Louis, iron | 9.50-10.00 |
| St. Louis, steel | 10.00-10.50 |

**NO. 1 CAST SCRAP**

| | |
|---|---|
| Birmingham | 9.00- 9.50 |
| Boston, No. 2 | 6.00- 6.25 |
| Boston, tex. con. | 10.50-11.00 |
| Buffalo, cupola | 12.00-12.50 |
| Buffalo, mach. | 13.25-13.75 |
| Chicago, agri. net | 8.75- 9.25 |
| Chicago, mach. net | 9.25-10.25 |
| Chi., railroad net | 9.25- 9.75 |
| Cinci., mach. cup | 10.75-11.25 |
| Cleveland, cupola | 11.50-12.50 |
| Detroit, net | 10.50-11.00 |
| Eastern Pa., cupola | 12.50-13.00 |
| Pittsburgh, cupola | 13.50-14.00 |
| San Francisco, del. | 13.50-14.00 |
| Seattle | 7.00- 8.50 |
| St. Louis, No. 1 | 9.00- 9.50 |
| St. L., No. 1 mach. | 10.00-10.50 |

**HEAVY CAST**

| | |
|---|---|
| Boston, del. | 6.75- 7.00 |
| Buffalo, break. | 9.00- 9.50 |
| Cleveland, break. | 8.50- 9.00 |
| Detroit, break | 9.00- 9.50 |
| Detroit, auto net | 11.50-12.00 |
| Eastern Pa. | 12.00-12.50 |
| N. Y., No. 1, deal | 8.00- 8.50 |
| N. Y., break. deal | 8.00- 8.50 |
| Pittsburgh | 12.50-13.00 |

**MALLEABLE**

| | |
|---|---|
| Boston, consum. | 12.50-13.00 |
| Buffalo | 13.25-13.75 |
| Chicago, R. R. | 12.50-13.00 |
| Cincinnati, agri. del. | 9.75-10.25 |
| Cinci., R. R. del. | 10.50-11.00 |
| Cleveland, rail. | 13.00-13.50 |
| Detroit, auto | 9.75-10.25 |
| St. Louis, R. R. | 9.75-10.25 |
| Eastern Pa., R. R. | 11.50-12.50 |

**RAILS FOR ROLLING**

*5 feet and over*

| | |
|---|---|
| Birmingham | 11.00-11.50 |
| Boston, dealers | 7.75- 8.00 |
| Buffalo | 11.75-12.25 |
| Chicago | 12.50-13.00 |
| Eastern Pa. | 13.00 |
| New York, dealer | 7.50- 8.00 |
| St. Louis | 11.00-11.50 |

**LOCOMOTIVE TIRES**

| | |
|---|---|
| Chicago (cut) | 12.50-13.00 |
| St. Louis, No. 1 | 9.50-10.00 |

**LOW PHOS. PUNCHINGS**

| | |
|---|---|
| Buffalo | 13.75-14.25 |
| Chicago | 13.00-13.50 |
| Eastern Pa. | 14.50-15.00 |
| Pittsburgh | 16.00-16.50 |

# Nonferrous Metal Prices of the Week

*Spot unless otherwise specified. Cents per pound*

| | Copper: Electro., del. Conn. | Copper: Lake, del. Midwest | Copper: Casting, refinery | Straits Tin: New York Spot | Straits Tin: New York Futures | Lead: New York N. Y. | Lead: East St. L. | Zinc: St. L. | Aluminum: 98-99% | Antimony: Spot, N. Y. | Ingot Nickel |
|---|---|---|---|---|---|---|---|---|---|---|---|
| March 10 | 8.00 | 8.12½ | 7.75 | 53.65 | 53.67½ | 4.00 | 3.90 | 4.37½ | *22.90 | 7.62½ | 36.00 |
| March 12 | 8.00 | 8.12½ | 7.75 | 54.00 | 54.00 | 4.00 | 3.90 | 4.37½ | *22.90 | 7.62½ | 36.00 |
| March 13 | 8.00 | 8.12½ | 7.75 | 54.20 | 54.22½ | 4.00 | 3.90 | 4.37½ | *22.90 | 7.50 | 36.00 |
| March 14 | 8.00 | 8.12½ | 7.75 | 54.00 | 54.05 | 4.00 | 3.90 | 4.37½ | *22.90 | 7.50 | 36.00 |
| March 15 | 8.00 | 8.12½ | 7.75 | 54.00 | 54.05 | 4.00 | 3.90 | 4.37½ | *22.90 | 7.50 | 36.00 |
| March 16 | 8.00 | 8.12½ | 7.75 | 53.80 | 53.85 | 4.00 | 3.90 | 4.37½ | *22.90 | 7.65 | 36.00 |

*Nominal quotation. Market range 19.00c to 22.90c.

# Warehouse Iron and Steel Prices

*Cents per pound for delivery within metropolitan districts of cities specified*

| STEEL BARS | |
|---|---|
| Baltimore* | 2.75c |
| Boston†† | 2.90c |
| Buffalo | 2.95c |
| Chattanooga | 3.26c |
| Chicago | 2.90c |
| Cincinnati | 3.10c |
| Cleveland | 2.90c |
| Detroit | 2.98½c |
| Houston | 3.00c |
| Los Angeles | 3.40c |
| New Orleans | 3.00c |
| New York‡(d) | 3.17c |
| Pittsburgh | 2.85c |
| Philadelphia* | 2.75c |
| San Francisco | 3.55c |
| Seattle | 3.40c |
| St. Louis | 3.14c |
| St. Paul | 3.00c |
| Tulsa | 3.25c |

| IRON BARS | |
|---|---|
| Portland | 3.40c |
| Baltimore* | 2.60c |
| Chattanooga | 3.26c |
| Chicago | 2.75c |
| Cincinnati | 3.10c |
| Detroit | 2.98½c |
| New York‡(d) | 3.10c |
| Philadelphia* | 2.75c |
| St. Louis | 3.14c |
| Tulsa | 3.25c |

| REINFORC. BARS | |
|---|---|
| Boston | 2.75c-3.25c |
| Buffalo | 1.95c |
| Chattanooga | 3.26c |
| Chicago | 1.95c-2.10c |
| Cleveland (c) | 1.97½c |
| Cincinnati | 3.10c |
| Houston | 3.25c |
| Los Ang., cl. | 2.15c |
| New Orleans | 3.00c |
| New York | 3.17c |
| Philadelphia | 2.62½c |
| Pitts., plain | 3.00c |
| Pitts., twisted squares | 3.12½c |
| San Francisco | 2.45c |
| Seattle | 2.45c |
| St. Louis | 3.29c |
| Tulsa | 3.25c |
| Young. | 2.30c-2.60c |

| SHAPES | |
|---|---|
| Baltimore* | 2.75c |
| Boston†† | 3.07c |
| Buffalo | 3.20c |
| Chattanooga | 3.46c |
| Chicago | 3.10c |
| Cincinnati | 3.30c |
| Cleveland | 3.21c |
| Detroit | 3.30c |
| Houston | 3.00c |
| Los Angeles | 3.40c |
| New Orleans | 3.50c |
| New York(d) | 3.27c |
| Philadelphia* | 2.75c |
| Pittsburgh | 3.05c |
| Portland | 3.40c |
| San Francisco | 3.50c |
| Seattle | 3.40c |
| St. Louis | 3.34c |
| St. Paul | 3.25c |
| Tulsa | 3.50c |

| PLATES | |
|---|---|
| Baltimore* | 2.75c |
| Boston†† | 3.08c |
| Buffalo | 3.20c |
| Chattanooga | 3.46c |
| Chicago | 3.10c |
| Cincinnati | 3.30c |
| Cleveland, ¼-in. and thicker | 3.21c |
| Cleve., ⅜-in. | 3.20c |
| Detroit | 3.30c |
| Detroit, ⅜-in. | 3.10c |
| Houston | 3.00c |
| Los Angeles | 3.40c |
| New Orleans | 3.50c |
| New York(d) | 3.30c |
| Philadelphia* | 2.75c |
| Phila. floor | 4.35c |
| Pittsburgh | 3.05c |
| Portland | 3.40c |
| San Francisco | 3.50c |
| Seattle | 3.40c |
| St. Louis | 3.34c |
| St. Paul | 3.25c |
| Tulsa | 3.50c |

| NO. 10 BLUE | |
|---|---|
| Baltimore* | 2.95c |
| Boston†† | 3.15c |
| Buffalo | 3.10c |
| Chattanooga | 3.26c |
| Chicago | 2.95c |
| Cincinnati | 3.10c |
| Cleveland | 3.01c |
| Det., 8-10 ga. | 3.03½c |
| Houston | 3.35c |
| Los Angeles | 3.65c |
| New Orleans | 3.50c |
| New York | 3.17c |
| Portland | 3.65c |
| Philadelphia* | 2.95c |
| Pittsburgh | 2.85c |
| San Francisco | 3.75c |
| Seattle | 3.65c |
| St. Louis | 3.19c-3.36c |
| St. Paul | 3.45c |
| Tulsa | 3.70c |

| NO. 24 BLACK | |
|---|---|
| Baltimore*† | 3.50c |
| Boston (g) | 3.75c |
| Buffalo | 3.25c |
| Chattanooga | 4.01c |
| Chicago | 3.70c |
| Cincinnati | 3.85c |
| Cleveland | 3.76c |
| Detroit | 3.78½c |
| Los Angeles | 4.15c |
| New York | 3.65c |
| Philadelphia*† | 3.40c |
| Pittsburgh** | 3.40c |
| Portland | 4.25c |
| San Francisco | 4.25c |
| Seattle | 4.25c |
| St. Louis | 3.94c |
| St. Paul | 3.695c |
| Tulsa | 4.75c |

| NO. 24 GAL. SHEETS‡ | |
|---|---|
| Baltimore*† | 3.75c |
| Buffalo | 4.00c |
| Boston (g) | 4.35c |
| Chattanooga | 4.61c |
| Chicago | 4.20c-4.30c |
| Cincinnati | 4.45c |
| Cleveland | 4.36c |
| Detroit | 4.45c |
| Houston | 4.40c |
| Los Angeles | 4.75c |
| New Orleans | 4.35c |
| New York | 4.25c |
| Pitts.** | 3.90c-4.20c |
| Portland | 4.85c |
| San Francisco | 4.85c |
| Seattle | 4.85c |
| St. Louis | 4.54c |
| St. Paul | 4.19c |
| Tulsa | 5.10c |
| Philadelphia*† | 4.00c |

| BANDS | |
|---|---|
| Baltimore | 3.05c |
| Boston†† | 3.15c |
| Buffalo | 3.30c |
| Chattanooga | 3.51c |
| Chicago | 3.20c |
| Cincinnati | 3.35c |
| Cleveland | 3.26c |
| Detroit, ⅜-in. and lighter | 3.28½c |
| Houston | 3.25c |
| Los Angeles | 3.90c |
| New Orleans | 3.20c |
| New York(d) | 3.42c |
| Philadelphia | 3.05c |
| Pittsburgh | 3.10c |
| Portland | 3.90c |
| San Francisco | 4.05c |
| Seattle | 3.90c |
| St. Paul | 3.20c |
| Tulsa | 3.45c |
| St. Louis | 3.44c |

| HOOPS | |
|---|---|
| Baltimore | 2.80c |
| Boston | 4.15c |
| Buffalo | 3.55c |
| Chicago | 3.20c |
| Cincinnati | 3.35c |
| Det., No. 14 and lighter | 3.28½c |
| New York | 3.42c |
| Philadelphia | 3.30c |
| Pittsburgh | 3.60c |
| Seattle | 5.40c |
| St. Paul | 3.75c |

| COLD FIN. STEEL | |
|---|---|
| Baltimore (c) | 3.71c |
| Boston | 4.00c-4.50c |
| Buffalo (h) | 3.55c |
| Chattanooga* | 4.06c |
| Chicago (h) | 3.50c |
| Cincinnati | 3.70c |
| Cleveland (h) | 3.50c |
| Detroit | 3.63½c |
| Los Ang.(f)(d) | 5.95c |
| New Orleans | 4.25c |
| New York | 3.92c-4.42c |
| Philadelphia | 3.73c |
| Pittsburgh(h) | 3.45c |
| Portland (f) | 4.75c |
| San Fran.(f)(d) | 5.95c |
| Seattle (f)(d) | 4.75c |
| St. Paul | 3.20c |
| St. Louis | 3.74c |
| Tulsa | 4.65c |

| COLD ROLL. STRIP | |
|---|---|
| Boston, 0.100-in., 500 lb. lots | 5.20c |
| Buffalo | 5.25c |
| Chicago (b) | 5.65c |
| Cincinnati | 5.80c |
| Cleveland (b) | 5.55c |
| Detroit | 5.40c |
| Philadelphia | 4.00c |
| New York | 4.55c |
| St. Louis | 5.74c |

(b) Net base, straightening, cutting, boxing, 1 ton or more.
(c) Plus mill, size and quantity extras.
(d) Minus quant. diff.
(e) New mill classif.
(f) Rounds only.
(g) 50 bundles or over.
(h) Outside delivery, 10c less.

‡Domestic bars.
*Plus quan. extras.
**Under 25 bundles.
*†50 or more bundles.
†New extras apply.
††Base 40,000 lbs. extras on less.

Prices at Detroit, Cleveland, Chicago, Pittsburgh, Cincinnati, Chattanooga, New York, Boston, St. Louis on heavier lines are subject to new quantity differentials:

399 pounds and less, up 50 cents; 400 to 9999 pounds, base; 10,000 to 19,999 pounds, 15 cents under; 20,000 to 39,999 pounds, 25 cents under; 40,000 pounds and over, 35 cents under base.

# Current Iron and Steel Prices of Europe

**Dollars at Rates of Exchange, Mar. 15**

## Export Prices f. o. b. Ship at Port of Dispatch—By Cable (or Radio)

| PIG IRON | British gross tons U. K. ports £ s d | | Continental Channel or North Sea ports, metric tons Gold parity, $4.8665 | £ s d |
|---|---|---|---|---|
| Foundry, 2.50-3.00 Silicon. | $14.92 | 2 18 6 | $8.52 | 1 15 0 |
| Basic bessemer | 13.77 | 2 14 0* | 7.30 | 1 10 0 |
| Hematite, Phos. .03-.05 | 16.70 | 3 5 6 | .... | ..... |
| **SEMIFINISHED STEEL** | | | | |
| Billets | $28.05 | 5 10 0 | $11.44 | 2 7 0 |
| Wire rods, No. 5 gage | 39.78 | 7 16 0 | 21.90 | 4 10 0 |
| **FINISHED STEEL** | | | | |
| Standard rails | $39.53 | 7 15 0 | $26.77 | 5 10 0 |
| Merchant bars | 1.65c | 7 5 0 | .69c to .72c | 3 2 6 to 3 5 0 |
| Structural shapes | 1.67c | 7 7 6 | .63c | 2 17 6 |
| Plates, †¼ in. or 5 mm. | 1.82c | 8 0 0 | .91c | 4 2 6 |
| Sheets, black, 24 gage or 0.5 mm. | 2.10c | 9 5 0 | 1.27c | 5 15 0 |
| Sheets, gal., 24 gage, corr. | 2.55c | 11 5 0 | 1.43c | 6 10 0 |
| Bands and strips | 1.82c | 8 0 0 | .88c | 4 0 0 |
| Plain wire, base | 2.21c | 9 15 0 | 1.18c | 5 7 6 |
| Galvanized wire, base | 2.61c | 11 10 0 | 1.38c to 1.40c | 6 5 6 to 6 7 6 |
| Wire nails, base | 2.72c | 12 0 0 | 1.27c | 5 15 0 |
| Tin plate, box 108 lbs. | $ 4.21 | 0 16 6 | ..... | ..... |

British ferromanganese $85 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d 4($3.74) f.o.b.

## Domestic Prices at Works or Furnace—Last Reported

| | £ s d | | French Francs | | Belgian Francs | | Reich Marks |
|---|---|---|---|---|---|---|---|
| Fdy. pig iron, Si. 2.5 | $17.21 | 3 7 6(a) | $13.16 | 200 | $14.21 | 305 | $25.04 | 63 |
| Basic bessemer pig iron | 16.58 | 3 5 0(a)† | 12.17 | 185 | 13.75 | 295 | 27.62 | (b)69.50 |
| Furnace coke | 4.59 | 0 18 0 | 7.90 | 120 | 5.13 | 110 | 7.65 | 19.25 |
| Billets | 28.05 | 5 10 0 | 28.29 | 430 | 20.50 | 440 | 38.35 | 96.50 |
| Standard rails | 1.87c | 8 5 0 | 2.10c | 700 | 2.31c | 1,100 | 2.38c | 132 |
| Merchant bars | 1.95c | 8 12 0 | 1.68c | 560 | 1.16c | 550 | 1.98c | 110 |
| Structural shapes | 1.99c | 8 15 0 | 1.65c | 550 | 1.16c | 550 | 1.94c | 107.50 |
| Plates, †¼-in. or 5 mm. | 1.96c | 8 12 6 | 2.10c | 700 | 1.47c | 700 | 2.29c | 127 |
| Sheets, black | 2.33c | 10 5 0§ | 2.55c | 850‡ | 1.63c | 775‡ | 2.59c | 144‡ |
| Sheets, galv., corr., 24 ga. or 0.5 mm. | 2.89c | 12 15 0 | 4.50c | 1,500 | 3.15c | 1,500 | 6.66c | 370 |
| Plain wire | 2.21c | 9 15 0 | 3.39c | 1,130 | 2.31c | 1,100 | 3.11c | 173 |
| Bands and strips | 2.38c | 10 10 0 | 1.95c | 650 | 1.47c | 700 | 2.29c | 127 |

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continental usually for basic-bessemer steel. (a) del. Middlesbrough. (b) hematite

# Bars

**Bar Prices, Page 58**

**Pittsburgh**—A slight decline in the rate of automotive bar buying has been partly countered by continuing fair specifications from farm implement manufacturers and steady demand from the miscellaneous manufacturing trade. Pittsburgh base prices continue 1.75c for carbon bars and 2.45c for alloy bars.

**Cleveland**—Specifications to Cleveland bar mills from railroad car builders have improved, and miscellaneous demand is fairly good, adding to well sustained tonnage from the automobile industry. Contracting is spotty. While some consumers have been anxious to cover requirements for second quarter, others are limiting purchases to April. Some first quarter contracts will not be fully specified before April 1.

**Chicago**—Steel bar specifications are generally steady, although shipments to several industries are increasing. Farm implement manufacturers show further gains in schedules but movement to the automotive industry is hesitating somewhat. Second quarter contracting is slow. Soft steel bars are 1.80c, Chicago, with rail steel 1.70c and bar iron 1.60c.

**Boston** — Commercial steel bar specifications are light. Small tool makers, machinery builders and some activity by forging shops furnish most current volume. Prices are unchanged at 2.15c, delivered Boston. Little covering has been done for next quarter.

Springfield, Mass., armory closes bids March 22 on 100 tons of nickel steel bars and small lots of hot and cold-rolled steel bars.

**New York**—Release of materials for railroad equipment is being expected momentarily. Meanwhile specifications are light with second quarter contracting proceeding slowly. The market is unchanged at 1.75c, Pittsburgh, or 2.08c, New York.

**Philadelphia** — Some protective covering is being done in soft steel bars but the market is quiet and devoid of feature.

# Plates

**Plate Prices, Page 58**

**Pittsburgh**—Plates showed more activity last week with Carnegie Steel Co. rolling on about 8000 tons of plates and car shapes for the Pennsylvania railroad, and the first river barge order in many months being placed. Ohio River Co., Cincinnati, has conditionally awarded six standard coal barges each 175 x 26 x 11 feet, requiring 978 tons of plates. It is understood the order has been divided equally between Jones & Laughlin Steel Corp. and McClintic-Marshall Corp. Pittsburgh-Des Moines Steel Co. will fabricate 123 tons of plates for a water supply system at Indiantown Gap Military reservation in Pennsylvania. Bids will go in March 26 to army engineers at Kansas City, Mo., for 640 pieces of 28-inch welded pipe fabricated from plates. McClintic-Marshall Corp., Bethlehem, Pa., has been awarded a steel grader barge for Vicksburg, Miss., engineers. Plates continue based on 1.70c, Pittsburgh.

**Cleveland**—Except for freight cars, the market for plates is quiet, though some consumers have shown more disposition to contract for second quarter requirements. The Cleveland plate mill last week operated at 25 per cent. Some additional releases have been issued for material for the Van Sweringen lines' 12,725 freight cars, and the tonnage is expected to increase shortly. Erie is inquiring for 50 cement-carrying cars, requiring 500 tons of plates, shapes and bars.

**Chicago**—Although slight gains in railroad plate requirements are noted, the volume is light. Ordering of material by railroad equipment builders is expected to start within the next week or two and some repair programs of railroads are getting under way. Tank work still is slow, with only moderate improvement noted in inquiries from municipalities and oil companies. Plates continue 1.75c, Chicago.

**Boston**—Plate specifications are active. New Bedford, Mass., has an inquiry out for several hundred tons of 48-inch steel pipe and the Holyoke, Mass., pipe fabricator took more than 800 tons of caisson pipe for the parcel post building foundations at Boston. Miscellaneous buying is fairly good. Some plates are being specified for the American cup defender being built at Bristol, R. I. Prices are unchanged.

**New York**—With spot demand light and second quarter contracting still to be developed, platemakers are awaiting releases against freight car orders. A fair tonnage is in early prospect, however, with the navy taking bids March 20 on close to 3000 tons of plates for seven coast guard cutters to be built in eastern navy yards. Prices are unchanged at 1.80c, Coatesville, Pa., or 1.98c, New York.

**Philadelphia** — Consumers show some disposition to contract ahead for protection against possible higher prices should steel wages be advanced. Practically all contracting is under the percentage plan. Pennsylvania Shipping Co., Philadelphia, is inquiring for 20 pressure tanks, requiring 500 tons of plates. Two elevated tanks at Indiantown Gap, Pa., requiring 123 tons of plates, are reported placed with a Pittsburgh fabricator. Little locomotive plate tonnage has developed although builders expect placing of over 200 locomotives this year in addition to requirements of the Pennsylvania, as well as substantial locomotive repairs.

## Contracts Placed

978 tons, six standard coal barges, 175 x 26 x 11 feet, for Ohio River Co., Cincinnati, conditionally awarded as follows: 489 tons each, or three barges apiece, to Jones & Laughlin Steel Corp., Pittsburgh, and McClintic-Marshall Corp., Bethlehem, Pa.

208 tons, plates and shapes, water supply system, Indiantown Gap Military reservation, Indiantown Gap, Pa.; 123 tons of plates and 85 tons of shapes to Pittsburgh-Des Moines Steel Co., Pittsburgh.

150 tons, grader barge for Vicksburg, Miss., engineers, to McClintic-Marshall Corp., Bethlehem, Pa.

## Contracts Pending

500 tons, Pennsylvania Shipping Co., Philadelphia, 20 pressure tanks; inquiry current.

390 tons, 22-inch 14-gage pipe line, metropolitan water district, Los Angeles; bids March 12.

300 tons, tank, Santa Cruz, Calif.

140 tons, pontoon pipe for United States engineers, Sacramento, Calif.; bids soon.

110 tons, lighthouse tender for lighthouse department, Portland, Oreg.; bids opened.

100 tons, oil barge, 80 x 26 x 5 feet, United States engineers, New Orleans; bids March 29.

100 tons, elevated tank, Bolivia, Mo.

Unstated, bureau of reclamation project, Caspar, Wyo.; J. A. Terteling & Sons, Boise, Idaho, and Ed. Peterson, Omaha, Nebr., low for two siphon projects.

## Semifinished

**Semifinished Prices, Page 59**

The largest recent semifinished order in the open market at Pittsburgh was one for approximately 3000 tons of special billets. Nonintegrated tin mills continue to take heavier tonnages of sheet bars for finishing. Billets and sheet bars hold at $26, Pittsburgh. Wire rods continue $36, Pittsburgh. A slightly heavier demand from some bolt and nut manufacturers is noted.

# Shapes

**Structural Shape Prices, Page 58**

**Boston**—Award of 5000 tons for the Fore river bridge superstructure, Quincy-Weymouth, Mass., features the market here. More than 12,000 tons of structural material is approaching the bidding stage. The largest is the railroad lift span over the Cape Cod canal, taking close to 6000 tons. While the CWA project at the army base has not been officially awarded the 3500 tons of piling and other material will go to the Bethlehem Steel Co. when the work is formally authorized.

**Pittsburgh**—PWA funds for which application was made in February by Allegheny county may be granted soon for ten projects at Pittsburgh, which include six large structural steel bridges. Cost of these now is estimated at $25,000,000.

Bids for the state letting of March 9 reveal Lackawanna Steel Construction Corp., Buffalo, low on the 917-foot truss bridge in Perry county, requiring 815 tons of shapes. Plain structural shapes continue 1.70c, Pittsburgh.

**Cleveland**—Federal engineers here after negotiating some weeks for 2000 tons of sheet piling for a breakwall at Huron, O., have awarded the contract for stone construction. Fabricators here expect an early award of 640 tons for a postoffice at Binghamton, N. Y., requiring 640 tons, and several other substantial tonnages still are pending.

**Chicago**—New inquiries include about 6500 tons for bridges in various states, the list being headed by 2600 tons for a structure at Apalachicola, Fla. Bids close this week at Milwaukee on a filtration plant involving 1700 tons of piling and 800 tons of shapes. Activity here is confined principally to several private structures, the number of which has increased moderately.

**New York**—Taking 4600 tons of structural steel, the United States Steel Products Co. has been awarded contracts by the navy for radio towers at Summit, Canal Zone and Lualualei, T. H. For the Hillside Apartments, New York, 5000 tons have been awarded American Bridge Co.

**Philadelphia**—Specifications have been issued for a section of the Camden, N. J., approach to the high-speed line bridge over the Delaware river, requiring 2200 tons of fabricated shapes, 500 tons of plain shapes, 1700 tons of piling, and 1100 tons of concrete bars. Bids on 1300 tons of piling for Cape May, N. J., exceed the appropriation.

The New Jersey senate has approved construction of a tunnel under the Delaware river near Philadelphia, following similar action in the Pennsylvania legislature several weeks ago. Steel requirements, which will be large, have not been determined definitely.

## Contracts Placed

5000 tons, Hillside Apartments, New York, to American Bridge Co., Pittsburgh; through Starrett Bros. & Eken Co.

5000 tons, superstructure, Fore river bridge, Quincy-Weymouth, Mass., to McClintic-Marshall Corp., Bethlehem, Pa.

1800 tons, department store for William H. Block Co., Indianapolis, to Central States Bridge & Structural Co., Indianapolis.

1100 tons, radio towers for navy department in Summit, Canal Zone, and Lualualei, T. H., to United States Steel Products Co., New York. This is in addition to 3500 tons for same purpose reported last week as awarded to same interest.

850 tons, highway bridges, Minnesota; 400 tons to American Bridge Co., Pittsburgh, 250 tons to Minneapolis-Moline Power Implement Co., Minneapolis, 200 tons to Illinois Steel Bridge Co., Jacksonville, Ill.

750 tons, highway bridges, Nebraska, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

505 tons, Pennsylvania railroad bridge, Camden, N. J., to American Bridge Co., Pittsburgh.

380 tons, mesh and bars, route 23, section 13A, Passaic and Morris counties, New Jersey, to Igoe Bros., Newark, N. J., and Truscon Steel Co., Youngstown, O. Igoe Bros. took bulk of tonnage in mesh.

350 tons, bridge, Long Island railroad, Amityville, N. Y., to McClintic-Marshall Corp., Bethlehem, Pa.; through Faircroft Engineering Co.

323 tons, bridges, Pensacola, Fla., to Ingalls Iron Works Co., Birmingham, Ala., with Dudley Bar Co., Birmingham, taking 65 tons of reinforcing bars; C. G. Kershaw Contracting Co., Birmingham, general contractor.

300 tons, warehouse, Irona, Calif., for American Potash & Chemical Co., to Ingalls Iron Works Co., Birmingham, Ala.

300 tons, building, Wilson & Co., Chicago, to Hansell-Elcock Co., Chicago.

300 tons, bridges, Faurquier and Roanoke counties, Virginia, to Virginia Bridge & Iron Co., Roanoke, Va.; 60 tons of concrete bars to Virginia Steel Co., Richmond, Va.; through M. S. Hudgins, contractor.

300 tons, gun sheds for Fort Lewis, Wash., to Isaacson Iron Works, Seattle; Henrickson-Ahlstrom Co., Seattle, general contractor.

280 tons, state highway bridge, Pearson, Ga., to McClintic-Marshall Corp., Bethlehem, Pa.

275 tons, steel piling, sewer, Washington, to Kalman Steel Corp., Bethlehem, Pa.

275 tons, highway bridges, Oklahoma, to J. B. Klein Iron Foundry Co., Oklahoma City, Okla.

265 tons, piling, city of Chicago, to Inland Steel Co., Chicago.

260 tons, underpass, route 25, Spring street, St. Elizabeth, N. J., to Phoenix Bridge Co., Phoenixville, Pa.; through J. E. Chapman & Sons.

250 tons, hangar, Aberdeen proving grounds, Maryland, to Dietrich Bros., Baltimore.

250 tons, sheet piling for sewer, Washington, to Kalman Steel Corp., Bethlehem, Pa.; through P. & A. J. Ellis.

200 tons, dormitory, Stillwater, Okla., to Capitol Steel & Iron Co., Oklahoma City.

200 tons, addition to plant of Great Lakes Steel Corp., Ecorse, Mich., to Whitehead & Kales Co., Detroit.

200 tons, woodenware building, Cloquet, Minn., for Berndst-Foster-Dixfield Co., to American Bridge Co., Pittsburgh; through S. L. Peebles.

200 tons, hangar, Fort Benning, Georgia, to Ingalls Iron Works Co., Birmingham, Ala., and Concrete Steel Co., New York; J. S. McCauley & Co., Atlanta, Ga., general contractor.

180 tons, bridge, Long Island railroad, Glendale, N. Y., to McClintic-Marshall Corp.; through George H. Fuller Co.

180 tons, shapes and bars, bridge, St. Francis county, Arkansas, to Arkansas Foundry Co., Little Rock, Ark.; through Dixon & Dixon.

170 tons, repairs to bridge, Williamsport, Md., to Washington Berkley Bridge Co.

170 tons, bridge, Gordon, Pa., for Reading Co., to McClintic-Marshall Corp., Bethlehem, Pa.

150 tons, piling, dam, Aberdeen, S. Dak., to Inland Steel Co.; Campbell, Lowrie, Lautermilch Corp., Chicago, general contractor.

140 tons, beams and girders, Boone City, Iowa, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

135 tons, three I-beam spans, Frontier City, Nebr., to Pittsburgh-Des Moines Steel Co., Pittsburgh.

120 tons, school, Smyrna, Del., to Landsdale Structural Steel & Machine Co., Landsdale, Pa.; through Cantera Construction Co.

120 tons, administration building for Jay, N. Y., to New York Steel Corp., New York; through P. J. Murphy Co.

120 tons, candy plant, Peter Paul Co., Naugatuck, Conn., to Victor W. Tarney & Co., Bridgeport, Conn.

115 tons, bridge, Hopkins, Minn., to American Bridge Co., Pittsburgh.

100 tons, state bridge, Harris county, Texas, to Virginia Bridge & Iron Co., Roanoke, Va.; E. L. Martin Inc., Dallas, Tex., general contractors.

100 tons, shapes and bars, state bridges, near Chickasha, Okla., to J. B. Klein Iron & Foundry Co., Oklahoma City; J. W. Hopper Co., Oklahoma City, general contractor.

100 tons, natatorium, West Seattle Wash., to Isaacson Iron Works, Seattle; Weldon Construction Co., Seattle, general contractor.

100 tons, improvements to Shea's Sen-

## Shape Awards Compared

| | Tons |
|---|---|
| **Week ended March 17** | **21,533** |
| **Week ended March 10** | **13,725** |
| **Week ended March 3** | **22,671** |
| **This week in 1933** | **6,135** |
| **Weekly average for 1933** | **15,413** |
| **Weekly average 1934** | **17,214** |
| **Weekly average February** | **19,676** |
| **Total to date 1933** | **113,852** |
| **Total to date 1934** | **206,577** |

eca theater, Buffalo, to Ernst Iron Works, Buffalo.

100 tons, garage, Lockport, N. Y., to R. S. McManus Steel Construction Co., Buffalo.

100 tons, shapes and bars, fire station, Baltimore, to Concrete Steel Co., and Maryland Steel Products Co., Baltimore.

## Contracts Pending

2600 tons, Apalachicola bay bridge, Florida; bids March 22.

2500 tons, including 1700 tons piling, filtration plant, Milwaukee; bids March 20.

850 tons, precooling plant, Ft. Pierce Development Co., Ft. Pierce, Fla.

815 tons, bridge, Newport, Pa.

815 tons, steel through-truss bridge 917 feet long, Perry county, Pennsylvania; Lackawanna Steel Construction Corp., Buffalo, low at $113,807.38; bids of March 9. Federal government must concur before award is made.

750 tons, four highway bridges, Iowa.

700 tons, bridge, Logan, W. Va.

700 tons, Broadway tunnel, Oakland, Calif.; bids March 22.

660 tons, Wilson high school, Washington; McClosky & Co., Philadelphia, low for general contract.

640 tons, overhead crossing, Blackhawk, Wis.; bids March 29.

600 tons, fertilizer plant at nitrate plant No. 2, Sheffield, Ala., for Tennessee Valley Authority; bids March 23.

525 tons, three highway bridges, Illinois.

500 tons, bridge, Pocahontas, Ill.

500 tons, high school, Beloit, Wis.

462 tons, Washington state highway projects; bids at Olympia, Wash., March 27.

360 tons, state highway department project in Johnson county, Kentucky; Holmes Construction Co., Wooster, O., low bidder for general contract.

350 tons, brew house, Detroit, for Tivoli Brewing Co.

325 tons, bridge, Tonawanda, N. Y.

300 tons, bridge, Paintsville, Ky.

275 tons, lock No. 13, Delhi, O.

270 tons, sheet piling for Coulee dam bridge piers, Washington; government to furnish materials; Western Construction Co., Seattle, low.

225 tons, two government buildings, Aberdeen, Md.

220 tons, state hospital, Trenton, N. J.

200 tons, shapes, concrete bars and rods, service station for Firestone Tire & Rubber Co., Cleveland.

200 tons, state library and school, Ossining, N. Y.

200 tons, bridge, Ft. Worth, Tex.

190 tons, bridge, Albemarle county, Virginia; bids in.

150 tons, Alsea state bridge, Oregon; bids at Portland, Oreg., April 5.

150 tons, bridge, Brighton, O., for Chesapeake & Ohio railroad.

150 tons, 33 lookout towers for United States forest service, Oakland, Calif.; bids opened.

125 tons, high school, Shippensburgh, Pa.; bids rejected.

120 tons, addition Heinz canning works, Medina, N. Y.; bids March 22.

100 tons, street railroad garage, Lawrence, Mass.

Unstated, Pennsylvania railroad bridge over Anacosta river near Washington; Empire Construction Co., Baltimore, reported low.

# Reinforcing

**Reinforcing Bar Prices, Page 59**

**Pittsburgh**—The reinforcing steel bar market is active, with new billet steel bars continuing firm at 1.90c base, Pittsburgh. A second Boulder dam letting was closed March 16, the tonnage being 3000 tons, and similar in size to a letting of Feb. 23 on which Sheffied Steel Corp., Kansas City, Mo., is low. A state highway letting on which bids will be received at Harrisburg, Pa., March 29, involves concrete reinforcing work in three Pennsylvania counties.

**Cleveland**—Award of 2500 tons of concrete bars for Cleveland's southerly sewage disposal plant to the Patterson-Leitch Co., Cleveland, with the material to be supplied by the Cleveland bar mill, is outstanding in this market. Concrete bar fabricators have revised their flat charge of $3 a ton for detail engineering service to a sliding scale of $1 to $3 a ton, the latter figure applying to 100 tons or less.

**Chicago**—Interest is centered on the Milwaukee filtration plant for which bids close this week on 6200 tons of bars. Public work elsewhere involves fairly large lots, while shipments for highway work against old orders are expected to increase shortly. Additional purchases for Illinois highway construction have been made. Bids will be taken soon on 400 tons additional for Chicago sanitary district work.

**Boston**—Reinforcing steel requirements have dropped, with only a fair volume coming out for highways and bridges. Close to 375 tons is required for a seawall at Hampton, N. H., on which bids are in.

**New York**—Several hundred tons have been placed for New York and New Jersey highway work. State hospitals pending bring up the volume slightly. Cut length bars are steady at 1.90c, Pittsburgh.

**Philadelphia** — Apart from 1100 tons of concrete bars for the Camden, N. J. approach to the high-speed line over the Delaware river bridge, on which specifications have been issued, little activity is noted in the market here. Sellers report orders as light as at any time this year.

## Concrete Awards Compared

| | Tons |
|---|---|
| **Week ended March 17** | **4,483** |
| **Week ended March 10** | **5,760** |
| **Week ended March 3** | **4,524** |
| **This week in 1933** | **2,508** |
| **Weekly average for 1933** | **3,771** |
| **Weekly average 1934** | **4,079** |
| **Weekly average, February** | **3,683** |
| **Total to date 1933** | **43,812** |
| **Total to date 1934** | **48,948** |

## Contracts Placed

2500 tons, southerly sewage disposal plant, Cleveland, to Patterson-Leitch Co., Cleveland; through Hunkin-Conkey Construction Co., Cleveland; material to be supplied from Cleveland bar mill.

1000 tons, causeway, Mare Island, Calif., to Soule Steel Co., San Francisco.

208 tons, state bridge, Terrell county, Texas, to Central Texas Iron & Steel Co.; E. L. Witham Co., Wichita Falls, Tex., general contractor.

200 tons, road work, Illinois, to Calumet Steel Co., Chicago.

195 tons, state bridge, Harris county, Texas, to Sheffield Steel Corp., Kansas City, Mo., through Alamo Iron Works, San Antonio, Tex.; E. L. Martin Inc., Dallas, Tex., general contractor.

100 tons, highway project, Chemung county, New York, to Kalman Steel Corp., Bethlehem, Pa.; through Warren Bros. Roads Co.

100 tons, highway project, Nasau county, New York, to Kalman Steel Corp., Bethlehem, Pa.; through Carlton Construction Co.

100 tons, St. Landry parish, Louisiana, to Laclede Steel Co., St. Louis; through A. C. Campbell Construction Co.

## Contracts Pending

6200 tons, filtration plant, Milwaukee; bids March 20.

3000 tons, Boulder dam; bids March 16.

1000 tons, Alsea state bridge, Oregon; bids at Portland, April 5.

560 tons, Park street bridge, Oakland, Calif.; Truscon Steel Co., San Francisco, low.

400 tons, postoffice, Richmond, Va.; Wills, Taylor & Mafera, New York, low on general contract.

360 tons, seawall, Hampton, N. H.; bids in March 9.

325 tons, highway and bridges, Virginia; bids March 15 and 22.

300 tons, water filtration plant, Fort Peck, Mont., construction camp; bids to United States engineer, Kansas City, Mo., April 6.

110 tons, highway and bridge, route 25 section 17a, Spring street, Elizabeth, N. J., also 51 tons of structural material; bids April 2 at Trenton.

100 tons, plain steel bars, 917-foot steel through-truss bridge and extension of a reinforced concrete culvert, Perry county, Pennsylvania; Lackawanna Steel Construction Corp., Buffalo, low; bids of March 9. Federal government must concur before award is made.

100 tons, state highway work, Richey county, West Virginia; J. M. Francesca, Fayetteville, W. Va., low; bids of March 7.

Unstated, Coulee dam bridge piers, Washington; government to furnish materials; Western Construction Co., Seattle, low.

# Railroads

**Track Material Prices, Page 59**

Placing and rolling of steel rails is increasing. Western roads ordered 18,100 tons last week, the Wabash 10,000 tons, Missouri-Kansas-Texas 4700 tons, and the Chicago Great Western 3400 tons. They were divided between Chicago and Colorado mills.

Closing of the Erie's inquiry is said to be a matter of only a few days. Formal inquiry by the New York Central and Baltimore & Ohio are expected to be issued shortly.

Bethlehem Steel Co. has started rolling 10,000 tons of Pennsylvania rails at Lackawanna, N. Y., its first long run in eight months. Carnegie Steel Co. has completed rolling of 11,000 tons for the same road at its Edgar Thomson plant. The same plant is rolling 3460 tons of track fittings for the Pennsylvania.

Allotments by PWA for railroad purchases include a loan of $3,820,000 to the Great Northern and $75,000 to the Ft. Smith & Western. Great Northern has applied for $1,305,000 for the purchase of 20,000 tons of rails, 7900 tons of tie plates, joints, bolts and other accessories. Boston & Maine has been allotted $2,230,000, of which $2,000,500 is for rails and fastenings. Kansas, Oklahoma & Gulf has been loaned $255,000 for the purchase of 5186 tons of rails and sufficient fastenings to lay them.

Pittsburgh & West Virginia will use its loan of $331,000 to buy three locomotives from Baldwin Locomotive Works, Eddystone, Pa. Baltimore & Ohio has applied to the interstate commerce commission for authority to spend $4,279,244 for construction and equipment, of which $4,000,000 will be borrowed from PWA. It plans to repair 4800 freight cars, build 820 steel gondolas, repair 200 automobile cars, and recondition 240 locomotives.

The Pennsylvania will open bids March 26 on about 5000 tons of steel for its second quarter requirements, including, in addition to bars, plates and shapes, spikes, tie plates, reinforcing bars and steel piling. A separate inquiry asks for 50 tons of pipe and 100 tons of tubes. The Pennsylvania has placed orders for a large quantity of specialties for car repairs, including metal ends, side doors and brakes.

Youngstown Steel Door Co., Youngstown, O., has received an order for 12,000 steel doors, requiring 2000 tons of steel, which will be rolled by the Youngstown Sheet & Tube Co., Youngstown, O.

Releases of steel are being issued for cars for the Van Sweringen lines.

Central of New Jersey has started repair of 259 cars at its shops at Elizabethport, N. J. Norfolk & Western will equip 100 automobile cars with loading devices. The Erie is inquiring for 50 cement cars, requiring 500 tons of steel.

## Car Orders Placed

Chicago Great Western, 2700 tons to 50 passenger, 25 baggage, to own shops.

New York, New Haven & Hartford, 50 coaches, to Osgood, Bradley Car Co., Worcester, Mass.

## Rail Orders Placed

Chicago Great Western, 2700 tons to Illinois Steel Co., 700 tons to Inland Steel Co., Chicago.

Missouri-Kansas-Texas, 2500 tons to Illinois Steel Co., Chicago, 1100 tons to Colorado Fuel & Iron Co., Denver, 1100 tons to Inland Steel Co., Chicago.

Wabash, 6850 tons to Illinois Steel Co., Chicago, 3150 tons to Inland Steel Co., Chicago.

## Car Orders Pending

Western Maryland, 20 cabooses.

Seaboard Air Line, 1000 box and 100 phosphate cars; inquiry expected soon.

# Sheets

**Sheet Prices, Page 58**

**Pittsburgh** — Sheet buyers, particularly automotive interests, began to curtail specifications last week for the first time this year. There were no cancellations but forward buying appeared to be interrupted by the threat of possible labor troubles. The decline, however, has not been sufficient to reduce the rate of operations in the sheet industry to less than 55 per cent, as compared with slightly over 60 per cent a week ago. The market still is 2.25c, Pittsburgh, for black sheets; and 1.75c, Pittsburgh, for heavy hot-rolled. Cold-rolled grades are 2.30c and 2.75c, Pittsburgh, for heavy and light gages, respectively.

**Cleveland**—Some sheet producers have received specifications from automobile manufacturers for delivery through April which will sustain their mill operations.

Consumers in the automobile field, however, continue cautious in contracting for the entire second quarter; the incentive is not strong enough, with steel prices extended. On the other hand, producers, facing rising costs, are not pushing for contracts. Demand from makers of household equipment is good.

A leading manufacturer of electric refrigerators now is on the highest schedule in its history.

**Chicago**—Sheet shipments to automotive interests showed some hesitancy the past week, due entirely to the labor situation. Deliveries to the Nash Motors Co. still are suspended by strikes at various plants, while some hold-ups recently were encountered at other companies. Demand elsewhere is well maintained.

**Boston**—Railroads have ordered out the bulk of immediate requirements. Range and small tank builders are taking small lots.

**New York**—While sheet buying in general continues sluggish, two or three fair-size tonnages are pending for building construction. Possibly the largest of these involves 550 tons of heating and ventilating material for the new postoffice here, more than 400 tons being galvanized sheets and the remainder hot rolled sheets. An air-conditioning company in this district has recently booked some substantial business for federal buildings in Washington.

**Philadelphia** — Contrary to the normal trend, sheet specifications this month are at a slower rate than in the preceding two months. Radio manufacturers' demand is quiet; automotive specifications are lighter; stovemakers are nearing the end of their season, and building construction is negligible.

**Youngstown, O.**—Youngstown Steel Door Co., Youngstown, O., a subsidiary of Youngstown Sheet & Tube Co., has been awarded 12,000 steel car doors by the Pennsylvania railroad, this order requiring about 2000 tons of steel, mainly sheets, to be furnished by the Sheet & Tube company.

**Cincinnati** — Sheet demand remains strong but new orders are restricted to early needs. Production continues near 70 per cent.

**St. Louis**—Producers and distributors report further expansion in specifications and new orders. The improvement, however, is in galvanized material, the South accounting for relatively larger tonnages than other sections.

## Refractories

**Refractories Prices, Page 60**

A rapidly increasing number of orders for refractory brick is noted. Although they are small individually, and represent only repair work in Pittsburgh district open-hearths and blast furnaces, the total volume is comparable with the peak last summer. Prices are firm.

# Pipe

Pipe Prices, Page 59

**Pittsburgh**—American pipe mills have been informed that their share of the prospective 40,000 tons of pipe from Russia probably will be increased from 16,000 tons to 28,000 tons. Orders for this material probably will be closed upon through the Amtorg Trading Corp. in New York. Bids were opened March 17 by Pittsburgh engineers on 21,000 feet of ½ to 4-inch welded steel pipe, delivery on which will be made to Coraopolis, Pa., for use in construction of the Montgomery locks. Line pipe business is inactive. Pipe mill operations at Pittsburgh are little more than 25 per cent. Allegheny county controller receives bids until March 27 for iron and steel pipe, among other items.

**Chicago**—Action on pending cast pipe work is more active and with the approach of more seasonable weather, orders are expected to increase. Several fairly large awards have been made recently including 2300 tons for Springfield, Ill., and 1200 tons for Council Bluffs, Iowa. Cook county has placed 1000 tons for an infirmary here with an additional 225 tons for the same project to be bought by CWA. Lincoln, Nebr., closes bids this week on 430 tons.

**Boston**—Springfield, Mass., takes bids this week on close to 300 tons and Methuen, Mass., is also in the market for cast pipe. New Bedford, Mass., is taking bids on several hundred tons of 48-inch steel pipe, and several other small steel pipe projects are being figured.

**New York** — Pending state hospital work involving cast pipe is being supplemented by an additional 500 tons on which bids are in. Awards are light and include some material for CWA projects.

**St. Louis**—Distributors of cast pipe report a slackening in orders during late February and early this month as a result of severe weather conditions. Sales since the turn of the year, however, are about 25 per cent ahead of the same period in 1933. Pipeline inquiries indicate a more favorable season than during the preceding two or three years.

## Cast Pipe Placed

2300 tons, various sizes, Springfield, Ill., to Lynchburg Foundry Co., Lynchburg, Va.
1200 tons, Council Bluffs, Iowa; 750 tons to Glamorgan Pipe & Foundry Co., Lynchburg, Va.; 450 tons to American Cast Iron Pipe Co., Birmingham, Ala.
1000 tons, 12-inch, Cook county, Illinois, infirmary, to Lynchburg Foundry Co., Lynchburg, Va., placed by the county; J. B. Clow & Sons Co., Chicago, low on 225 tons to be bought by CWA.
100 tons, watermain extension, Mattoon, Ill., to United States Pipe & Foundry Co., Burlington, N. J., and to the American Cast Iron Pipe Co., Birmingham, Ala.; James & Shinn Co. Inc., Mattoon, Ill., general contractor.

## Cast Pipe Pending

2265 tons, 36-inch, Cincinnati; bids March 20; alternate on wrought and concrete.
825 tons, 8-inch and under with fittings, Pittsburgh, Tex.; bids in.
500 tons, water and sewer lines, Gowanda state hospital, Helmuth, N. Y.; bids in.
430 tons, 12 and 16-inch, Lincoln, Nebr.; bids March 20.
275 tons, 8, 12 and 16-inch, Springfield, Mass.; bids March 20.
250 tons, Catlin, Ill.
250 tons, McLean, Ill.
100 tons, Camp Murray, Wash.; bids in.

## Steel Pipe Pending

725 tons, 16 to 28-inch, dredge pipe for dam, Fort Peck, Montana; bids March 26, United States engineer, Kansas City, Mo.
510 tons, 48-inch, New Bedford, Mass.
150 tons, maximum second quarter requirements, pipes and tubes, Pennsylvania railroad; bids close March 26.
100 tons, 20-inch i. d., 3/16-inch plate rivet-weld special shore discharge pipe, United States engineer, Jacksonville, Fla.; bids March 22.

# Strip Steel

Strip Prices, Page 59

**Pittsburgh**—Contracting for second quarter has not been heavy. Of more pressing consideration is delivery on first quarter contracts, which expire in another two weeks. Pittsburgh bases on strip hold at 1.75c for hot-rolled and 2.40c for cold-rolled.

**Cleveland**—In only one instance so far has there been a hold-up of strip specifications due to labor difficulties in consumers' plants, and the tonnage is relatively unimportant. Generally, specifications continue heavy, and sustain mill operations at their recent rates. More contracts are being closed covering second quarter requirements.

**Boston**—Cold-rolled strip operations are barely at 40 to 50 per cent as demand improves slowly with automobile partsmakers contributing some improvement. Prices are unchanged at 2.60c, Worcester.

**Chicago**—While strip shipments have been fairly well maintained, a slight recession in the movement to some automotive plants is noted due to uncertainties resulting from the labor situation. Demand elsewhere is holding. Second quarter contracting is commencing with prices unchanged at 1.85c, Chicago, for hot strip and 2.40c, Pittsburgh-Cleveland for cold-rolled strip.

**New York**—Volume of strip buying is subject to varying reports but indications point to at least mild improvement compared with a week ago. Practically all buying is spot, with little future interest. Prices are steady.

# Wire

Wire Prices, Page 59

**Pittsburgh**—Slowness with which demand for wire from the merchant trade has developed has been a disappointment and although March has recorded improvement tonnage has been below expectations. The nail market continues $2.35 per keg, with plain wire 2.20c, Pittsburgh.

**Cleveland**—Shipments of wire and wire products this month are well ahead of the comparable period in February, with demand from automobile manufacturers brisk. Seasonal and miscellaneous requirements are more in evidence.

**Chicago** — Wire demand shows some hesitancy, automotive shipments being slightly less active. Activity in wire products has shown less than anticipated betterment. Shipments this month are heavier than in February and demand for manufacturers' wire has increased fairly substantially. Distributors, including jobbers and retailers, are slow to increase specifications. While some orders are being received for second quarter shipment, consumers are slow to sign contracts in view of continuation of present prices into that period.

**Boston**—Wire mill operations are up slightly this week, although gains are small and improvement is largely due to slightly better demand for specialties. Manufacturers' wire is duller and in general the increase in drawing operations shows few gains, although little ground has been lost on the other hand. Plain bright wire holds at 2.30c, Worcester, Mass.

**Philadelphia**—Contracting in the wire market is improving although actual specifications are light. Prices are steady.

# Ferroalloys

Ferroalloy Prices, Page 60

Ferroalloy prices have been extended for second quarter, with sellers opening books for that period. Specifications are fairly good, notably from makers of alloy steels.

# Pig Iron

Pig Iron Prices, Page 60

**Pittsburgh** — An order for 220 steel mill rolls, divided among makers in the Pittsburgh district, which was placed last week by Tata Iron & Steel Co., India, should be of benefit indirectly to the pig iron market but otherwise steel and gray iron foundries alike continue disinterested in the iron market. The Sharpsville, Pa., stack of Shenango Furnace Co. is the only merchant furnace blowing in this region as Davison Coke & Iron Co.'s Neville Island furnace still is banked. There is no change in market prices, with $17 the local base on basic iron, $18 on foundry and $18.50 on bessemer.

**Cleveland**—Shipments this month are about 25 per cent ahead of those in the comparable period last month, and new demand continues upward. A lake merchant furnace interest here booked during the week 10,000 tons more for the second quarter. Leading malleable shops with automotive accounts are working at 100 per cent, with demand for that grade strong. Railroad castings also are in better demand, while there has been a mild improvement in requirements from agricultural machinery builders. It appears now that a compromise will be effected in the coal fields, with some increase in wages, and with higher costs in iron ore mining, pig iron producers look forward to an advance in their prices some time during the second quarter. For the present no changes are noted.

**Chicago**—Sales continue to improve, being substantially heavier than a month ago, while shipments also are larger than in February. Labor troubles in the automotive industry so far have had little effect on pig iron shipments except in the case of the Nash Motors Co. which still is closed. Malleable foundries are active in production of material for farm equipment, railroads and automotive plants. Steel foundries so far have shown little improvement in operations. The outcome of the proposal to increase wages is awaited for its effect on costs, with higher scales expected to be followed by advances in pig iron prices. The market currently is $17.50, furnace, for No. 2 foundry and malleable.

**Boston**—Inquiry is heavier, with several larger consumers showing more interest. Small-lot buying is fairly active with Buffalo and Mystic furnaces taking a good share of the volume. A Springfield, Mass., foundry is inquiring for 300 tons. Most of the small-lot buying is on the higher silicon grades. There is also better inquiry for malleable iron.

**New York**—Pig iron tonnage has expanded slightly, practically all for spot delivery. The foundry melt so far has failed to reflect the improvement anticipated earlier in the year. A number of consumers are still drawing upon stocks laid in last December. The recently announced reduction of $4 a ton at Birmingham, Ala., in bessemer iron, effective March 22, has focused attention of the trade here on the fact that the current spread between bessemer and foundry grades at Birmingham is $8.50, bessemer iron being quoted at $22 until the new price becomes effective. This spread compares with $1 at certain eastern basing points. At no other basing point in the country is the price higher than $19.50, except at Birmingham, it is pointed out.

**Philadelphia**—Reduction of $4 in the Johnson City, Tenn., base for low-phosphorus iron, effective March 17, applies only to several hundred tons of off-grade iron and does not affect remaining several hundred tons in stock at that point. Pennsylvania railroad opened bids last week on 145 tons of two grades of iron and will take bids on an additional lot March 26.

**Buffalo**—One blast furnace in this district is scheduled for withdrawal in the near future because of an accumulation of iron. Two merchant stacks and three steelworks units will continue in production, however. March shipments are slightly in excess of those of February.

**Cincinnati** — Melters show hesitancy in contracting for second quarter needs, recent purchasing being confined to small lots. Foundry operations are unchanged.

**St. Louis**—Buying continues based on current needs, but the aggregate for the first half of March is well ahead of the comparable period in February. A specialty maker in Illinois, ordinarily taking from 8000 to 10,000 tons annually, is asking for prices on 2500 tons of foundry iron for second quarter delivery. An implement builder in Iowa is inquiring for 1500 tons.

**Birmingham, Ala.**—Small orders predominate. Recent strike of coal miners has been terminated by mutual agreement.

**Toronto, Ont.**—Demand is improving. No future delivery contracts have been placed, but a number of melters are taking larger spot tonnages than formerly.

# Scrap

Scrap Prices, Page 61

**Pittsburgh**—Coincident with the closing of the Pennsylvania railroad list ten days ago, a weakness in the market became apparent, caused both by a withdrawal of important consuming mills for the time being and the weakening fact of small dealers trying to force scrap collections on the market. Although No. 1 heavy melting steel still is quoted $14.25 to $14.75 in this district based on the last sale at $14.50 there has been no test recently and it is a matter of speculation as to what price would govern the next sale. A 50-cent advance, however, has been recorded in cast grades, where there has been some activity.

**Cleveland**—Conditions in the steel and iron scrap market are easier but steelmakers are insisting on prompt shipments, sentiment continues to manifest strength and prices are holding well. One consumer has bought a tonnage of open-hearth grades at the quoted market.

**Chicago**—Scrap prices have eased moderately following attainment of a new peak. Substantial tonnages of heavy melting steel were sold at $12.50, an increase of 25 cents over the previous market. Mills have lowered their bids and dealers also are quoting lower prices. Available supplies have increased as a result of the recent upturn, and scrap is moving here in better volume from outlying areas. In view of sustained consumption at steel plants, the easier tone is regarded as only temporary.

**Boston**—Scrap prices are firm with buying slightly less active, although close to 3000 tons are to be bought at Boston and Providence, R. I., barge loading, mainly for eastern Pennsylvania. There are indications of a shortage of No. 1 melting steel, No. 2 coming out more freely.

**New York**—Heavy melting steel for barge loading is strong, dealers paying $9.50, barge for No. 1 with reports of higher prices unconfirmed. Bethlehem Steel Co. is an active buyer in this territory, including heavy melting grades and cast for shipment to Buffalo later by the barge canal. Shipments to eastern Pennsylvania mills are not heavy, although two are taking some No. 2 melting steel.

**Buffalo**—Bethlehem Steel Co. has purchased approximately 25,000 tons of scrap for Lackawanna, N. Y., at $13 for No. 1 heavy melting steel, $11.50 for No. 2, hydraulic bundles and No. 1 busheling. Dealers here took a good share of the business while some tonnage will come by

water later from outside sources. Local deliveries start at once.

**Philadelphia**—Trading in steel and iron scrap is quiet and prices are somewhat easier in many grades. Cast scrap is an exception, a slight advance being registered.

**Detroit**—A slightly easier situation exists in the steel and iron scrap market and several grades have been marked down 25 to 50 cents. This is largely due to weakness in consuming markets and general hesitancy caused by threats of labor trouble.

**Cincinnati**—A reported slackening in demand has weakened the scrap market slightly. Heavy melting steel remains unchanged, but some other grades are higher on adjustment to recent sales.

**St. Louis**—Heavier offerings by railroads has served to check the upward trend in iron and steel scrap prices. Sales reported the past several days were mainly of small lots for prompt shipment, the aggregate being light as compared with recent weeks.

**Birmingham**—The market for steel and iron scrap continues slow, with ample offerings and no change in prices.

**Toronto, Ont.**—Trading in iron and steel scrap shows improvement. Local dealers again are shipping heavy melting steel and turnings to the Hamilton district. Current demand is mainly in iron grades.

# Warehouse

**Warehouse Prices, Page 62**

**Pittsburgh**—Although cement coated and common nails out of Pittsburgh warehouse have been quoted $2.557, delivered to users with a railroad siding, and $2.584 delivered to customers without a siding, it was understood in the trade late last week that an advance to $2.60 per keg would be made effective March 19. Warehouse sales have been slow, but inquiry is fairly heavy.

**Cleveland**—The number of orders for some leading warehouse interests last week was the largest since the middle of 1930. Tonnage increased substantially. There is a strong, demand for bars and plates and fairly good buying of blue annealed sheets, while miscellaneous requirements also are expanding.

**Chicago**—Sales are slightly heavier than in February and are well ahead of the rate a year ago. Business is fairly well diversified as to products and type of buyers.

**Boston**—New England jobbers report a better warehouse volume since the first of the month. Buying is fairly well spread.

**New York**—Warehouse volume has improved encouragingly since the first of the month. Much of the gains have been for general industrial uses.

**Philadelphia**—March business is disappointing to warehousemen, expected improvement in demand having failed to develop. Prices are unchanged.

**Detroit**—Iron and steel out of warehouse continues at a high level, but a slight tendency to falter is observed by some. Thus far, however, March shows improvement over February to the same date.

**Cincinnati**—Increased demand for sheets from warehouse has been the feature of March business which will exceed the levels of January and February.

**St. Louis**—Warehouses report better demand for wire products. Sales are ahead of the comparable period in February.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"THE Industrial Brownhoist crane has been a most remarkable tool. We have been running it for over twenty years and it can get through with more work than any crane we have ever had any experience with".

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*General Offices:* Bay City, Michigan

*District Offices:* New York, Philadelphia, Chicago, Cleveland

INDUSTRIAL BROWNHOIST

## Metals

**Nonferrous Metal Prices, Page 60, 61**

**New York**—Generally speaking, nonferrous metal prices held fairly steady last week. Some business was done in copper, lead and tin, but zinc was quiet.

**Copper**—Fair-sized orders for copper were placed early in the week but buying lapsed later on the news from the code hearing in Washington that the industry's code was not acceptable and that the administration had presented its own draft. Opposition to the government code already has developed. A new hearing has been set for March 20.

**Lead**—Buying was in moderate tonnage, being mostly in carlots for both prompt and April delivery. Tone of the market has continued steady. Developments on the code are looked for soon.

**Zinc**—Price shading which developed in the preceding week continued. Prime western metal was available at 4.37½c, East St. Louis, although most sellers maintained a firm position at 4.40c. Buying was slow. Increased activity in galvanizing is anticipated.

**Tin**—Straits metal for spot delivery averaged closed to 54.00c during the week. A shortage of spot metal in London pushed the price up. The market was slightly easier as the week closed.

**Antimony**—Prices firmed up on advices of strength in the Chinese market.

**Aluminum**—Remelt grades eased slightly due to freer scrap offerings and slow demand. Virgin metal prices held.

**Silver**—Commercial bars dropped 1¼ cents to 45.50c following the government announcement that nothing would be done for the metal in the near future.

## Bolts, Nuts, Rivets

**Bolt, Nut, Rivet Prices, Page 59**

Bolt, nut and rivet makers generally have opened books for second quarter at unchanged prices, 70 off for bolts and nuts, 70 and 10 off for small rivets; and 2.75c, Pittsburgh, and 2.85c, Chicago, for large rivets. Wrought washers also are unchanged at 6.00 to 6.25 off list.

Contracting has been at a good rate at Pittsburgh, featured by the placing of about 2000 tons by the Pennsylvania railroad among a number of producers. Railroad buying at Chicago is increasing slowly but equipment makers have not yet covered for car orders they have booked. A New York seller finds March buying the best in three years. The Lehigh Valley has bought a tonnage for car repairs.

Releases from automobile manufacturers to Cleveland suppliers reflect increasing operations, and confidence that labor difficulties are to be settled shortly. Railroad orders still are limited to small lots. Implement makers have increased specifications.

## Tin Plate

**Tin Plate Prices, Page 58**

**Pittsburgh**—For the fourth consecutive week tin mill operations in the Pittsburgh district averaged 80 per cent, this being supported chiefly by a leading mill's rate of 85 per cent. However, in the past week at least one independent mill stepped up its rate to the average, and 12 full turns out of 15 appears to be the average operation in tin mills here today. Canmakers continue to issue specifications for April. Prices are steady, with standard tin plate $4.25 per base box; long ternes 3.25c; and tin-mill black sheets 2.65c, Pittsburgh.

**New York**—In addition to releases from the larger canmakers, a miscellaneous demand for tin plate the past week has far exceeded the expectations of most sellers. Export buying also is well sustained.

## Metallurgical Coke

**Coke Prices, Page 59**

Interstate commerce commission made effective March 16 mileage freight rates on by-product coke. These do away with odd cents by establishing an initial rate of 70 cents for the first 10 miles and progressing by steps of 10 cents. By-product coke is not being quoted on an oven base price, makers meeting prices in competition, regardless of the distance hauled.

Connellsville beehive furnace coke has been reduced 25 cents a ton to $3.25, ovens on yearly contracts. The market for short and quarterly shipment remains $3.50, ovens. Premium beehive foundry coke has been given an allowable deduction of 20 cents a ton from the $5 Connellsville oven base for shipment to the East, unchanged for other shipments. There has been no revision in beehive foundry at $4.25. Demand is steady in the metallurgical market.

Beehive coke ovens operating in the Connellsville region increased 109 last week, bringing the total to 1589, the same number as active in March, 1931, the first time since then this figure has been reached.

Chicago coke shipments to foundries are well above the February rate, with prices unchanged. At St. Louis the same condition prevails and shipments are being made to northwestern and southwestern users.

Changes in freight rates have lowered delivered prices on by-products coke to most consuming points in the Cincinnati area.

## Iron Ore

**Iron Ore Prices, Page 60**

**Cleveland**—The Ford Motor Co. is understood to be formulating an inquiry for its season's iron ore requirements, to be issued this month. The company did not buy any appreciable amount last year, and recently has increased its consumption. It relinquished its best mine, the Blueberry, to other interests last fall, but will continue to obtain a certain proportion of its requirements from the operating company.

A month ago, sentiment among Lake Superior iron ore producers generally was adverse to a price advance, but with the general labor situation changing, and costs mounting, some interests now appear to be inclined toward making an increase. The Ford inquiry may test the market.

The Lake Superior Iron Ore association reports shipments from Lake Erie docks in February amounted to 70,531 gross tons; and stocks March 1 on Lake Erie docks, 5,175,886 tons, compared with 5,105,339 tons last year.

## Cold Finished

**Cold Finished Prices, Page 59**

**Pittsburgh** — Cold-finished steel bars do not display a clear market trend. Automotive interests are not buying very far ahead and many jobbers appear to have adequate inventories. Farm implement makers have been fairly heavy buyers. The market holds at 2.10c base, Pittsburgh, for cold-finished carbon bars and 2.95c, Pittsburgh, for alloy bars.

## Quicksilver

**New York**—Quicksilver prices are firmer. Round and small lots generally are $76, a virgin flask of 76 pounds. Supplies continue restricted and buying slow.

## Steel in Europe

**Foreign Steel Prices, Page 62**

**London**—(*By Radio*)—While production of pig iron and steel ingots in Great Britain in February showed a slightly lower total than in January, this was entirely due to the shorter month. Pig iron output in February was 414,400 tons, daily rate of 14,800 tons, compared with 441,300 tons in January, a daily rate of 14,235 tons. Steel ingot production in February was 707,500 tons, at a daily rate of 29,479 tons, compared with 711,000 tons in January, a daily rate of 27,346 tons. Ninety blast furnace stacks are active.

Steel and iron exports in February totaled 141,992 tons, compared with 163,700 tons in January, a decline of 21,708 tons. Imports increased from 119,800 tons in January to 123,271 tons in February, a gain of 3471 tons.

Exports of pig iron from the Middlesbrough district in February were the lowest for two years but the domestic situation is strong and two more furnaces have been blown in. The steel trade generally is active, the Midlands being the quietest district. New Zealand has placed a railroad contract here. Exports of galvanized sheets and tin plate are declining, owing to low foreign prices.

The Continent reports export markets are fairly active. Japan is reported to have taken a large contract for cast iron water pipe in Mexico against strong competition.

## Coke By-Products

**Coke By-Product Prices, Page 59**

**New York**—Prices quoted on distillate are for shipment to April 1 only when price adjustment is expected. Demand for distillates is active. Naphthalene shipments have picked up following a slight price reduction. Sulphate of ammonia prices are expected to remain unchanged through June.

## Takes Bids on Road Signs

Bids on metal sign posts, reflectors and parts for hexagonal reflectors, reflecting panels and stop signs, will be received by road maintenance division of Allegheny county, Pennsylvania, department of highways, bridges and tunnels, until March 27.

Rail Steel Bar association has moved its offices from 33 North La Salle street to 228 North LaSalle street, Chicago. H. P. Bigler is secretary and A. V. Berthold is engineer.

## Staff Changes in Society of Automotive Engineers

Two new appointments to the staff of the Society of Automotive Engineers, New York, have been announced by John A. C. Warner, secretary and general manager. Edward F. Lowe has been chosen assistant general manager and C. B. Whittelsey Jr. assistant secretary.

Mr. Lowe has been associated in engineering and executive capacities with the automotive industry for the past 20 years. Mr. Whittelsey advances to his new position from the post of assistant to the general manager in which he has served since 1926.

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COLD ROLLED STRIP STEEL
ELECTRO COATED -COPPER
BRIGHT FINISH
ELECTRO COATED -ZINC

# Pacific Coast

Pacific Coast Prices, Page 59, 60, 62

**San Francisco**—(*By Air Mail*)—General business conditions continue to improve but bookings were not heavy during the week. One of the largest pending projects involves 2210 tons of reinforcing bars and 700 tons of structural shapes for the Broadway tunnel, Oakland, Calif., up for bids March 22. The United States engineers office, Kansas City, Mo., has opened bids on 2152 tons of copper conductor cable for the Rainbow power plant near Great Falls, Mont.

Soule Steel Co. secured the second largest reinforcing bar tonnage placed this year, 1000 tons for a causeway at Mare Island, Calif. More than 7600 tons of pending business will be placed, it is expected, within the next ten days, including over 3000 tons for Boulder dam. Truscon Steel Co. is low on 560 tons for the Park street bridge, Oakland, Calif.

Metropolitan water district, Los Angeles, opened bids March 12 for 290 tons of 22-inch, 14-gage welded pipe line. United States engineers office, Sacramento, Calif., will take bids for 140 tons of pontoon pipe.

Bids have been opened on 150 tons of shapes for lookout towers for the United States forest service, Oakland, Calif. United States engineers office, Sacramento, Calif., will call for bids soon for 140 tons of pontoon pipe.


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**Grade No. 1**—For Electric Welding. A low carbon Soft Wire with smooth action in the arc. Dead Soft Annealed or Bright Market Finish—Cut in 14 inch lengths.

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*Also Flux Coated Wire*

The Seneca Wire & Mfg. Company

*Established 1906*

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*Warehouses and Representatives in practically all principal cities*


## Buying Volume Is Larger

**Seattle**—Demand for larger tonnages is increasing, seasonal buying adding to activity in the iron and steel markets. Prices are firm.

Shapes led awards for the week, Isaacson Iron Works, Seattle, booking 300 tons for gun sheds at Fort Lewis, Wash., and 100 tons for a natatorium at West Seattle. Considerable new business has developed, including 270 tons of steel sheet piling and an unstated tonnage of reinforcing for piers of the Grand Coulee, Wash., dam bridge, for which the Western Construction Co., Seattle, bid low at $180,177. Bids have been opened for 100 tons of cast iron pipe for Camp Murray, Wash.

Bids for 1750 tons of reinforcing for Seattle's seawall improvement are to be taken in a few days. Washington state will receive tenders March 27 for steel spans in Spokane, King and Lewis counties requiring 100 tons of reinforcing bars and 462 tons of structurals.

Oregon highway commission has set April 5 for receiving bids for the Alsea bridge, involving 150 tons of shapes and 1000 tons of reinforcing bars. This is the first of five coast highway spans for which $5,200,000 is available, according to R. H. Baldock, state engineer. Bids will be asked for the Coos Bay structure April 26, Yaquina May 17, and the Suislaw and Umpqua spans June 17.

Cast iron pipe sellers report small inquiries, some material being bought for CWA projects.

Warehouse sales have improved, with better demand for sheets, plates, bars and boiler tubes. Shipyards are increasing purchases for repair work.

The scrap iron market is firm with continued demand from Japan. All steel scrap items are in strong demand with rails leading. Prices are expected to advance and buyers are looking for good material. Local consumption is slightly better although mills are stocked for immediate requirements.

## Equipment

**Pittsburgh**—Tata Iron & Steel Co., India, last week placed orders for approximately 220 steel mill rolls, covering its requirements for the coming year. Favorable rates of exchange brought the business to American rollmakers instead of to England as in previous years. Rolls which have been bought so far are for sheet and merchant bar mills with the expectation that this coming week rolls will be bought for the plate and rail mills. Other steel mill roll demand is good. Among heavier rolling mill equipment, there are several attractive inquiries out which promise to be closed on shortly, among which is some equipment for Ford Motor Co., including additional rolling mill stands. Last week, a Pittsburgh valve manufacturer closed on an important order with Wheeling Steel Corp. for valves to be used in the latter's new strip mill.

**Boston**—Machinery and equipment plants are fairly active, a few having good backlogs. There is more activity in grinding wheels. Brown & Sharpe Mfg. Co., Providence, R. I., is low on two milling machines for San Diego, Calif., navy yard. Four heat treating furnaces for Wright Field, O., are up, closing March 20. Several tools for the navy yard at Portsmouth, N. H., are up, including two bending rolls, slip-roll type.

**New York**—Machinery dealers report an increase in orders and better inquiries. Some standard tool equipment orders have been driven in by the machinery code requiring a 10-day notice of an advance in prices. Several of the larger machinery buyers have asked for figures on equipment with indications that buying will follow.

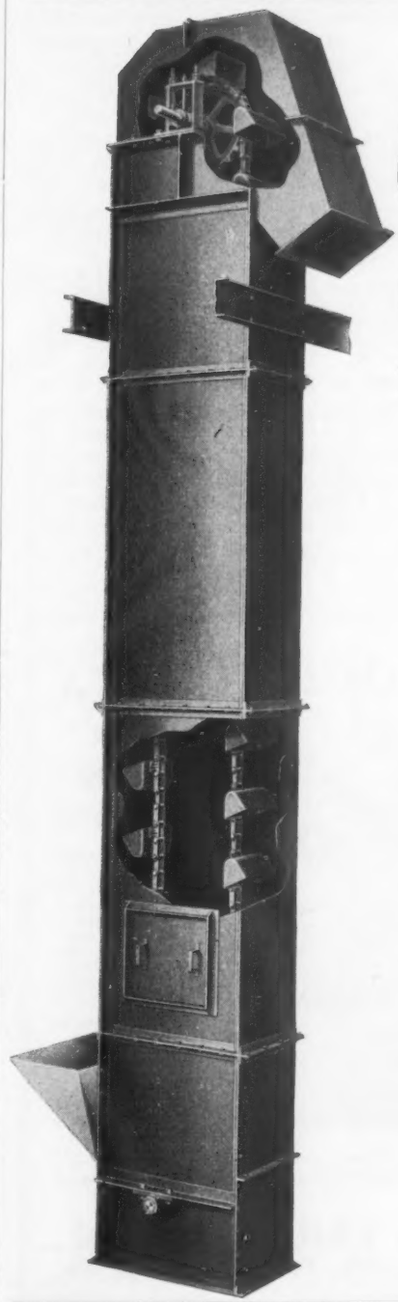
**Chicago**—Government projects continue to influence some equipment markets. TVA has taken bids on 12 cranes for the Tennessee project, while Orton Crane & Shovel Co. is low bidder on a 50-ton crane for the Louisville office, United States engineer. Business in this equipment from private sources also is fairly active.

Crane inquiries in the Milwaukee territory have picked up encouragingly in the last month. The largest award in the electric crane industry in at least five years is the government order to the Harnischfeger Corp., Milwaukee, for equipment valued at $250,000 for the power house of the Boulder dam project. The contract calls for four 300-ton cranes with two 30-ton auxiliary hoists and one 50-ton general utility crane.

Rock Island, Ill., arsenal is closing on three machine tools but has yet to ask for bids on a large volume of equipment for which a $400,000 federal appropriation has been proposed. Machine tools are pending for a number of government shops, bids closing soon on items for various points, including Pensacola, Fla., Pearl Harbor, Hawaii, and the Canal Zone. Kansas City, Mo., engineers open bids March 20 on internal combustion engines, electrical equipment, drive mechanism and auxiliary equipment for two 210-horsepower tow boats to be used at Ft. Peck, Mont. Reports from St. Louis indicate that the demand for coal mine machinery and equipment is the best in more than two years.

**Cleveland**—Inquiries for most lines


LINK-BELT



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FOR ALL MATERIALS

THE Link-Belt line of cost-reducing elevating and conveying equipment is complete, and includes all such elements as chains, sprockets, buckets, power transmission units, belt conveyor idlers, flight conveyors, bucket carriers, feeders, screw conveyor, etc.

We offer our products, our extensive facilities, and our wide experience, through the nearest office. Extensive stocks of standard Link-Belt parts are carried at convenient points throughout the country.

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Leading Manufacturers of Equipment
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of equipment are heavy and dealers are kept busy submitting figures. Closing business appears to be another matter, buyers in many cases lacking confidence to go ahead with needed purchases. A turret lathe manufacturer here reports figuring more business in the first three months of this year than for the same period in any of the last four or five years. Crane inquiries as well are more active.

## Financial

(*Concluded from Page* 14)

deficit swelling to $43,706,744 after taxes, depreciation, overhead and partial dividends on the preferred stock.

¶Bethlehem Steel Corp.'s pamphlet report for 1933 lists its production as including: Ore, 1,290,932 tons; limestone, 660,159 tons; coal, 2,584,126 tons; coke, 1,899,249 tons; pig iron and ferromanganese, 1,555,391 tons; open-hearth, bessemer and electric steel, 2,624,951 tons; rolled steel and other finished products for sale, 1,830,825 tons.

Daily average number of employes was 33,504, total wages $46,704,862, and average earnings per hour, exclusive of general administrative and selling force, were 55.4 cents. The billed value of products shipped in 1933 was $120,163,374, compared with $96,892,488 in 1932.

¶Wheeling Steel Corp., Wheeling, W. Va., and subsidiaries, pamphlet report for 1933 shows net loss of $284,430, including a credit of $255,405 arising from the purchase and retirement of bonds and a profit of $484,924 on the sale of investments but after providing for taxes, depreciation and interest. This loss is less than one-tenth of the 1932 net loss, which was $3,274,832, including a credit of $975,786 in bond retirement.

¶National Steel Corp., Pittsburgh, and subsidiaries, in its pamphlet report issued last week showed no change from the net profit reported in preliminary statements, which was $2,812,407 or $1.30 a share compared with net profit of $1,662,920, or 77 cents a share in 1932. Report just issued shows an increase in cash of $561,333 in the last year and a reduction in funded debt of $2,238,333, the decrease including provision for sinking fund requirements until Aug. 31, 1935.

¶National Supply Co. of Delaware and subsidiaries, including Spang-Chalfant & Co. Inc., Pittsburgh, reports consolidated net loss for 1933 of $2,815,960 after depreciation, taxes, interest and guaranteed dividends on National Superior Co.'s preferred stock but before dividends on Spang-Chalfant & Co.'s preferred stock, which are in arrears. In 1932, consolidated net loss was $3,847,638 after dividends paid on Superior Engine Co. and Spang-Chalfant preferred stocks.

¶International Nickel Co. of Canada Ltd., Copper Cliff, Ont., reports net profit of $9,662,583 in 1933, exclusive of exchange adjustments and profit of $1,739,617 carried to reserve.

Sales of nickel in all forms, including nickel and alloys, totaled 74,356,969 pounds in 1933, an increase of 116 per cent. World consumption of nickel in all forms was 96,000,000 pounds in 1933. Greater output and economies effected throughout the various plants of the company decreased the cost of metal refining, according to Robert C. Stanley, president, while unemployment was ameliorated, and increased production resulted in larger payrolls.

## Overhead Is Peril In Shorter Week

GEORGE D. HARTLEY, of Sleeper & Hartley Inc., Worcester, Mass., in analyzing the Connery 30-hour bill, warns that overhead will be increased at a ruinous rate for small manufacturers—and the great majority of manufacturing plants in the United States employ less than 50 persons—and sums up objections to a reduction in weekly hours as follows:

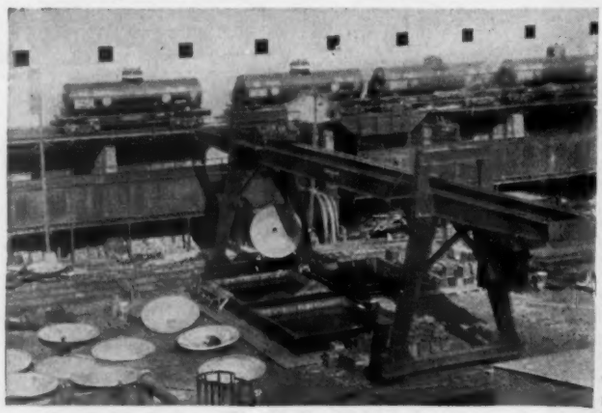
"The majority of our manufacturing plants must be run on single shift basis. They cannot derive any benefit from operating on double or triple shift whether they had the business or had not the business, nor can they employ more help on the reduced week.

"What really happens is that the output of each little factory is reduced; the cost of production within it increased enormously; the employes' purchasing power is reduced very materially; and the competitor in foreign countries gets quite a 'break.' "

To show the automatic increase in overhead and costs due to reductions in working hours per week in small single-shift plants, Mr. Hartley has compiled the following table in which an average overhead of 175 per cent on direct labor is assumed and an hourly rate of 60 cents has been taken for base:

| A reduction in the working week hours | | Increases percentage of overhead charged against direct labor from 175 per cent to | Increases overhead charge against each productive employe's working hour from $1.05 to |
|---|---|---|---|
| From | To | Per cent | Per hour |
| 55 | 50 | 192 | $1.17 |
| 55 | 48 | 200 | 1.20 |
| 55 | 44 | 218 | 1.30 |
| 55 | 40 | 240 | 1.44 |
| 55 | 36 | 267 | 1.60 |
| 55 | 35 | 275 | 1.65 |
| 55 | 30 | 320 | 1.92 |
| 50 | 48 | 182 | 1.09 |
| 50 | 44 | 198.8 | 1.19 |
| 50 | 40 | 218 | 1.30 |
| 50 | 36 | 243 | 1.46 |
| 50 | 35 | 250 | 1.50 |
| 50 | 30 | 291 | 1.75 |
| 48 | 44 | 191 | 1.14 |
| 48 | 40 | 210 | 1.26 |
| 48 | 36 | 233 | 1.40 |
| 48 | 35 | 240 | 1.44 |
| 48 | 30 | 280 | 1.68 |
| 40 | 36 | 190 | 1.14 |
| 40 | 35 | 200 | 1.20 |
| 40 | 30 | 233 | 1.40 |


*Woolford Wood Tanks*



Three Woolford Tanks, each 16 feet square used for No. 1 pickle finish on stainless iron or steel.

**FOR ALL PICKLING OPERATIONS**

**WOOLFORD WOOD TANKS** are constructed of carefully selected tank lumber — Lined or plain — Anti-acid rods, Lead Extruded Iron rods, or plain iron rods incased in *Woolford Anti-acid Plastic.*

Ask about our Special Wood Tank Lining.

Wood or Steel Tanks Rubber Lined.

Wood and steel tanks are also built to any specifications.

*Complete information furnished upon request.*

**G. WOOLFORD WOOD TANK MFG. CO.**

*Parschall P. O.* **PHILADELPHIA, PA.** *Factory:* **Darby, Pa.**

# Here and There In Industry

Continental Iron & Steel Co., 33 Rector street, New York, has opened a branch office in the Oliver building, Pittsburgh, in charge of Harvey D. Stalnaker, formerly head of the Stalnaker Steel Co., Pittsburgh, and previously Pittsburgh representative for the Joseph Schonthal Co., Ohio Iron & Metal Co. and Wilkoff Bros. Co. Continental Iron & Steel Co. was founded in 1901 by Samuel Joseph. Since his death in 1910 it has been under management of David Strauss and Milton Plant. It has been a large operator in railroad and industrial scrap as well as handling exports of scrap to many countries.

□ □ □

Carboloy Co. Inc., Detroit, manufacturer of cemented carbide tools and dies, has had an increase of 241 per cent in orders over February, 1933. Compared with the monthly average for all 1933, last month showed an increase of 137 per cent.

□ □ □

Link-Belt Co., Chicago, has added a domestic unit to its line of underfeed screw-type stokers, giving it ten sizes to cover the field from the domestic boiler to 250 horsepower. The new unit is being built at the Caldwell-Moore plant of company, 2410 West Eighteenth street, Chicago.

# Men of Industry

(*Concluded from Page* 19)

ber Co., New York sheet jobber. He has long been active in civic affairs, and in January assumed office as mayor, for a 3-year term, of Union township, northern New Jersey, a community of 17,000 in which he resides.

William A. Wein has been named assistant manager of sales in the Pittsburgh district sales office of the American company.

□ □ □

J. P. Krunech, formerly traffic representative of the American Car & Foundry Co., New York, has been named traffic manager.

□ □ □

Frank G. Davis, formerly associated with the Firth-Sterling Steel Co., McKeesport, Pa., has been appointed general sales manager for the Peninsular Steel Co., Detroit, with offices at 1030 McDougall avenue.

□ □ □

Carl Henning, metallurgist at the South Side works, Jones & Laughlin Steel Corp., Pittsburgh, has been appointed assistant general metallurgist for the company.

□ □ □

Norman J. Gould has been re-elected president and secretary of Goulds Pumps Inc., Seneca Falls., N. Y. Other officers and directors have been renamed.

□ □ □

John E. Garlent, works manager at Lansing, Mich., of the Motor Wheel Corp., has been elected a director of the corporation, increasing the number of members of the board to 11. Officers have been re-elected.

□ □ □

W. H. Gillies has been named Detroit district sales manager for the Corrigan, McKinney Steel Co., Cleveland, succeeding E. D. Pumphrey. He is the son of Donald B. Gillies, president of the Corrigan company.

□ □ □

William H. Wildes, of Chicago, has been elected a director of the Federal Screw Works, Detroit, succeeding Harold Kaufman, resigned. Other directors and officers were reappointed.

□ □ □

Herman F. Kluender has been elected vice president of the Detroit Alloy Steel Co., Detroit.

Edward A. Kreller, works manager for this company and the Detroit Gray Iron Foundry Co., has been elected to the board of directors of the former.

□ □ □

George D. Shanahan, for the past eight years vice president and general manager of the Motors Metal Mfg. Co., Detroit, has been appointed general manager of the Bossert Corp., Utica, N. Y. He succeeds to the position held by the late James R. Jones, who died about three years ago. Prior to 1926 Mr. Shanahan was general manager of the J. W. Murray Mfg. Co., Detroit.

□ □ □

Arthur G. Hopcraft, former purchasing agent for the city of Cleveland, has been named purchasing agent by the Cleveland Worm & Gear Co., Cleveland. He is a past president of the National Association of Purchasing Agents and of the Cleveland Purchasing Agents association.

□ □ □

R. R. Hetz in addition to his duties as field superintendent for the Standard Boiler & Plate Iron Co. of Niles, O., has formed an organization known as Hetz Construction Co., of Warren, O., to handle such work that is for the most part a field proposition. Among recent activities are the dismantlement of the Western Reserve plant of the Youngstown Sheet & Tube Co. at Warren, O., and the A.M. Byers Co., Girard, O., plant.

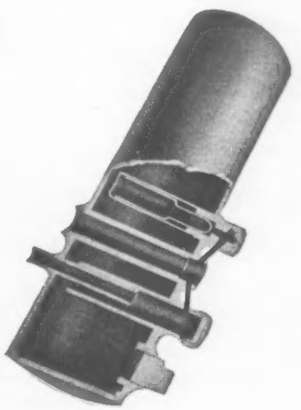

**One of 30,000**

**STAMPINGS**

***Produced by***

**CROSBY**

**Stamping Engineers**



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# Construction and Enterprise

## New England

BOSTON—Slater Mfg. & Engineering Co. has been formed to manufacture heating equipment by Ralph S. Taylor, 133 Bellevue avenue, Melrose, Mass.

RANDOLPH, MASS.—Eureka Split Ball Bearing Co. has been formed to manufacture ball bearings and similar devices, by Thomas H. Irving, 120 Old street.

HANOVER, N. H.—Wells, Hudson & Granger, Main street, Hanover, N. H., have prepared plans for the school board at Hanover, on which bids will be taken soon, for a high school to cost $185,000, including manual training department.

BURLINGTON, VT.—City plans construction of an electric light and power plant, including generators, diesel engines and accessories, to cost $200,000. R. E. Palmer, 7 Montgomery street, Holyoke, Mass., is engineer.

## New York

BROOKLYN, N. Y.—Diesel Equipment Corp. has been organized by Walter E. Buttle, 198 Washington avenue, Brooklyn, N. Y., to manufacture diesel engines.

DUNKIRK, N. Y.—Alco Products Co., subsidiary of American Locomotive Co., is increasing production steadily in its plant here, and will shortly move its engineering department back to Dunkirk from New York.

HUNTINGTON, L. I.—R. Burdick, superintendent of schools, will take bids soon on a high school building for which $550,000 has been appropriated, including manual training department.

JAMESTOWN, N. Y.—Receivers for the Metal Desk Co. have asked the federal court in Buffalo to approve a plan to borrow $100,000 on receivers' certificates, the money to be used to continue operations in the plant.

LOCKPORT, N. Y.—Entire machinery, equipment and tools of the Covert Gear & Mfg. Corp., Grand and Lock streets, will be sold at public auction March 22 and 23 by the Industrial Plants Corp. Equipment includes drills, reamers, hobs, milling cutters, grinders, screw machines, lathes, heat treating furnaces and other machinery.

NEW YORK—R. & R. White Metal Products Co. Inc. has been incorporated to deal in metal fixtures, by Howard Eisnitz, 551 Fifth avenue.

PULASKI, N. Y.—An election will be held soon on bonds for waterworks improvements, including two centrifugal pumps, total cost to be about $60,000. J. P. Wells, Rochester, N. Y., is engineer.

## New Jersey

AVENEL, N. J.—Security Steel Equipment Corp. has been incorporated with 1000 shares no par to deal in metal products. Frank A. Sandmann, 112 Bryant, Rahway, N. J., is agent.

LAKELAND, N. J.—Board of freeholders of Camden county is having plans made by Green & MacNelley Inc., Camden, N. J., for a powerhouse at the county hospital, costing $335,000. H. B. Hackett, Architects building, Philadelphia, is engineer.

## Pennsylvania

MYERSTOWN, PA.—An election will be held May 15 on $125,000 in bonds to pay for a municipal electric light plant. G. W. Scutt, 217 Waverly street, Shillington, Pa., is engineer.

## Ohio

DAYTON, O.—Dayton Malleable Iron Co., Dayton, O., has acquired ownership of the Elite Mfg. Co., Ashland, O., manufacturer of automotive equipment, and will move it to enlarged shops at Dayton.

FOSTORIA, O.—Great Northern Distilleries Inc., Don T. Hanover president, plans a 1-story powerhouse in connection with its proposed distillery, total cost to be $400,000. H. W. Hannah, 118 Massachusetts avenue, Detroit, is architect.

MASSILLON, O.—Massillon Rivet & Mfg. Co. will double its capacity from 2000 springs daily to between 4000 and 4500, necessitating the addition of new machinery.

NEWTON FALLS, O.—Newton Steel Co., Cleveland, has placed an order with the Semet-Solvay Engineering Corp., New York, for angle valves and four tar extractor heads for its plant here.

SANDUSKY, O.—City is having plans made for a municipal electric light and power plant and is seeking a loan of $1,000,000 and grant of $400,000 from PWA. Froelich & Emery Co., Second National Bank building, Toledo, O., is engineer.

TOLEDO, O.—Formed Steel Products Inc., 3168 Bellevue road, recently organized by W. Meredith Ashley, will manufacture stair treads and risers, elevator doors, steel partitions, steel hoppers, tanks, scale frames, industrial trucks, metal cabinets, and other products of this character.

## Michigan

DETROIT—Mildner & Eisen, 924 Hamm building, architects, have prepared plans for a 6-story brew house, 67 x 47 feet, for the Tivoli Brewing Co., 10129 Mack avenue.

DETROIT—Briggs Mfg. Co., 11631 Mack avenue, has awarded contract to Barton-Malow Co. for a top story addition to its Mack avenue plant, 83 x 140 feet.

DETROIT—Simmons Boiler Co., 550 South Junction avenue, has been incorporated with capital of $60,000 to manufacture heating equipment, by Charles L. Simmons, 12874 Mark Twain avenue.

DETROIT—National Sheet Steel Co. Inc., 13000 Lynton street, has been organized with capital of $100,000 to deal in steel products, by Joseph Gendelman, 17334 Wisconsin avenue.

DETROIT—Duke Stamping & Mfg. Co., 3439 Holbrook avenue, has been incorporated with capital of $50,000 to manufacture steel stampings, by Miecz Skorupski, 2504 Hewitt street.

MACKINAC ISLAND, Mich.—City plans an electric light and power plant to cost $150,000. E. Carey, Iron River, Mich., is engineer.

NILES, MICH.—City has asked a PWA loan for an electric light and power plant to cost $325,000.

## Indiana

RICHMOND, IND.—Richmond Turbine Pump Co. Inc., 800 South Seventh street, has been incorporated to manufacture pumps and electrical and mechanical appliances, by Walter G. B. Weidner, Alma Weidner and Newton W. Long.

## Illinois

AURORA, ILL.—City plans waterworks improvements, including a 1,500,000-gallon steel tank on tower, pumping equipment and accessories, to cost $50,000. PWA loan has been asked.

BELLEVILLE, ILL.—City plans construction of a waterworks plant on the Kaskaskia river near Fayetteville, Ill., watermains and other equipment, to cost $2 000,000. A PWA loan is pending. C. A. Heinzelman is city engineer. Caldwell Engineering Co., Jacksonville, Ill., is consulting engineer.

CHICAGO—Marvel Metal Products Corp., 38 South Dearborn street, has been incorporated to manufacture devices and machinery, by Norvin H. Franks, Jane Franks, and Walter Taylor. Correspondent: Isaac B. Lipson, 77 West Washington street.

GENESEO, ILL.—City is making preliminary surveys for a municipal gas plant and distributing system. Warren & Van Praag, Decatur, Ill., are engineers.

LAKE FOREST, ILL.—City will take bids late in March for improvements to the waterworks system, including filter and other accessories. PWA loan of $360,000 has been approved. Pearse, Greeley & Hansen, 6 North Michigan boulevard, Chicago, are engineers.

## Delaware

WILMINGTON, DEL.—Board of harbor commissioners, Christiania avenue, has been given authorization to expend $56,000 for improvement at its municipal marine terminal, including locomotive shed and shop, cargo mast and pumping station.

## District of Columbia

WASHINGTON—Bureau of supplies and accounts, navy department, will open bids March 23, schedule 1914, on one motor-driven universal

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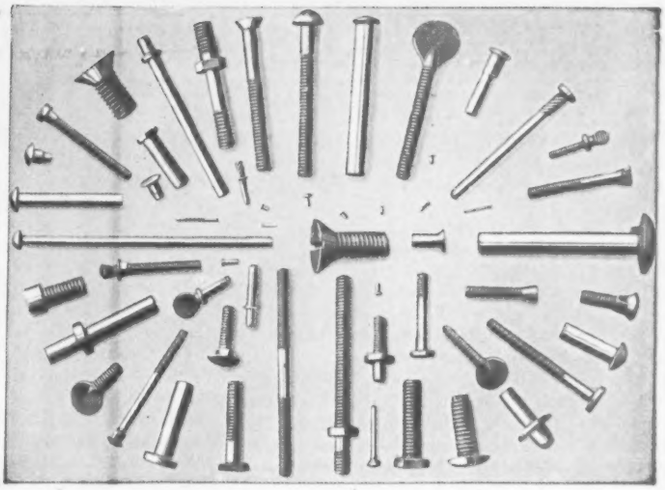

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### Florida

TAMPA, FLA.—Southern Brewing Co., C. A. McKay, president, has awarded contract to Blaw-Knox Co., Pittsburgh, for all machinery and brewing equipment for new plant at Zack and Pierce streets.

### Kentucky

CORBIN, KY.—Corbin Brewing & Ice Co. is planning to construct a brewery to cost $200,000, and will install beermaking equipment. Address proposals to T. Neal, care of Corbin Brewing & Ice Co.

GUTHRIE, KY.—City has loan and grant of $77,000 for construction of water works and filtration plant. Freeland & Roberts, Nashville, Tenn., engineers.

LOUISVILLE, KY. — Louisville & Nashville has awarded contract to George H. Rommel Co. for rebuilding its burned machine shop, at a cost of about $60,000.

### Maryland

BALTIMORE — Maryland Metal Casket Co. Inc., northwest corner North and Pennsylvania avenue, has been incorporated by William E. Tickner and John B. Tickner.

### North Carolina

GREENSBORO, N. C.—Proximity Mfg. Co. has awarded contract for construction of a new building, two stories, 138 x 415 feet, at the White Oak mills. This building will be equipped with the latest type humidifying equipment. A contract for 30,000 spindles has been placed with the Whitin Machine Works, Whitinsville, Mass.

THOMASVILLE, N. C.—Town has been allotted $75,000 for construction of 1,000,000-gallon elevated water storage tank.

### Missouri

KANSAS CITY, MO.—M. K. Goetz Brewing Co., St. Joseph, is having plans prepared for erection of brewery at Seventeenth street and Indiana avenue. Annual capacity of plant will be 100,000 barrels.

ST. LOUIS—Adolph Busch Inc., 1109 Title Guarantee building, has plans in progress for construction of brewery, including brew house, stock house, bottling plant, etc., at cost of about $500,000. George E. Wells Inc., Security building, engineer.

ST. LOUIS—Monarch Metal Weather Strip Co., 5020 Penrose street, has let general contract to John Hill Construction Co., Syndicate Trust building, for a new plant, one story, 120 x 180 feet, to cost about $45,000 with equipment. Clymounts & Heinicke, Wainwright building, are architects.

### Texas

HEARNE, TEX.—City will soon receive bids for water works improvements, pumping equipment, etc. J. W. Berretta Engineers, National Bank of Commerce building, San Antonio, engineers.

POTEET, TEX.—City, C. T. Chapel, mayor, plans voting on bonds for water works, pumping unit, tank and tower, to cost about $15,000. Lilly & Drought, Frost National Bank building, San Antonio, engineers.

SEGUIN, TEX.—City, Max Starcke, mayor, will receive bids April 4 for materials, machinery and equipment for constructing addition and improvements to hydroelectric and water works pumping plant. H. N. Tuley, Seguin, is consulting engineer.

TEXAS CITY, TEX.—Pan American Petroleum & Transport Co., 122 East Forty-second street, New York, is preparing to duplicate the first unit of its oil refinery here, in which more than $3,000,000 was invested.

### Wisconsin

MADISON, WIS.—Baldwin-Southwark Corp. is only bidder for furnishing United States forest products laboratory at University of Wisconsin with one 50-ton vertical hydraulic testing machine at $6821.

MANITOWOC, WIS.—Clinton Pattern & Foundry Corp. has been organized to deal in aluminum and brass castings and other foundry work, by Carl J. Clinton, Edward J. Hoffman, Dr. George M. Hoffman and Mrs. Lena Clinton.

MILWAUKEE—Master Lock Co., 926 West Juneau avenue, has leased 16,000 square feet additional floor space for the manufacture of laminated padlocks and


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MILWAUKEE — Metropolitan sewerage commission, Jones island, Lydia Bauer, secretary, closes bids March 29 for air compressor equipment with a capacity of 50,000 cubic feet per minute for sewage disposal plant extension. Alternate bids will be received on one additional unit of same size. Chain Belt Co., Milwaukee, is apparent low bidder at $79,800 for sludge removal equipment.

MILWAUKEE—Stolper Steel Products Co., 3258 West Fond du Lac avenue, maker of metal stampings and automobile specialties, has let contracts for a 2-story brick and steel factory addition, 50 x 53 feet.

MILWAUKEE — Milwaukee Malleable & Grey Iron Works has started work on extension to foundry at 2773 South Twenty-ninth street. Charles A. Gutenkunst is general manager.

SHEBOYGAN, WIS.—Burns & McDonnell Engineering Co., 107 West Linwood boulevard, Kansas City, Mo., has been engaged by common council to make survey with view of constructing municipal generating plant. Edwin Mohr is city clerk.

### Minnesota

WINTHROP, MINN. — City has plans under way for a municipal electric light and power plant to cost $75,000 for which federal loan is being negotiated. Bids will be asked in the spring. Ralph W. Richardson, New York Life building, St. Paul, Minn., is consulting engineer.

### Iowa

WINFIELD, IOWA—Bids will be received until March 22 on a municipal electric light and power plant, diesel generator equipment, to cost $70,000. Young & Stanley Inc., 211 Iowa avenue, Muscatine, Iowa, are engineers.

### Kansas

WASHINGTON, KANS.—City is having plans made for a municipal electric light and power plant of diesel engine-generator type, to cost $880,000. Federal loan and grant pending. Bids will be asked soon. E. T. Archer & Co., New England building, Kansas City, Mo., are engineers.

### Nebraska

HASTINGS, NEBR.—Central Nebraska Public Power & Irrigation association, D. W. Kingsley president, is negotiating for a federal loan and grant of $44,000,000 for construction of a hydroelectric and irrigation project on North Platte river. Clark E. Mickey, Hastings, Nebr., is engineer.

### Colorado

COLORADO SPRINGS, COLO.—Golden Cycle Corp., J. F. Underwood secretary, will build an electric generating steam power plant at Pikeville, Colo., five miles north, to furnish power to mines by a 6-mile transmission line.

PUEBLO, COLO.—Walter Brewing Co., M. Walter Jr. president, will build a boiler house, including two 250-horsepower boilers, 4000-gallon steel tanks, new carbonic acid equipment and other equipment, to cost $150,000.

### Pacific Coast

LAGUNA BEACH, CALIF.—J. C. Hickey, 2815 West boulevard, Los Angeles, has been awarded contract for construction of Arch Beach sewer system and treatment plant near here. This is a CWA project, and between 200 and 250 men will be employed for six months.

LOS ANGELES—John Parkinson and Donald B. Parkinson are preparing plans for a union passenger station for the Santa Fe, Union Pacific and Southern Pacific, to cost $1,000,000. Entire project will cost $8,500,000.

LOS ANGELES—Building permit has been applied for to construct $50,000 medical library and $25,000 club building at 1925 Filshire boulevard for the Los Angeles County Medical association. Gordon B. Kaufmann is the architect, and William Simpson Construction Co., 816 West Fifth street, is general contractor.

LOS ANGELES—Eccles & Davies Machinery Co. has moved to a larger plant at 1910 Santa Fe avenue, and is adding materially to its machinery and railway equipment.

SANTA MONICA, CALIF.—Douglas Aircraft Co. is building a $30,000 addition to its plant at Glover Field here. An $18,000 addition has just been completed.

PORTLAND, OREG.—Rose City Brewing Co., W. C. Crawford, brewmaster, is increasing capital stock and will expend $22,000 for storage cellars, ice machinery, compressor coils, and other equipment.

SEATTLE—Fentron Steel Works Inc. has been incorporated with capital of $10,000 by Herbert H. Schiessl, William F. Schiessl and Eric J. Miller.

SEATTLE — American Foundries Inc., gray iron castings, has opened its plant at 2944 First avenue, south.

TACOMA, WASH.—Northwest Brewing Co., Peter Marinoff president, is building a 5-story addition to its brewery, including new equipment, at 105 East Twenty-sixth street, to cost $100,000.

### Dominion of Canada

HAMILTON, ONT.—Dominion Foundries & Steel Co. is planning to erect a plant addition in the near future.

HAMILTON, ONT.—Steel Co. of Canada Ltd. will build an addition to its wire department and ingot mold building, to cost about $160,000.

## New Trade Publications

FLOW METER—Brown Instrument Co., Philadelphia, has issued a folder describing its electric flow meter.

POWER UNITS—Cushman Chuck Co., Hartford, Conn., in bulletin No. 127, describes its pull-push power units, illustrated by halftones and drawings and giving engineering data.

HEATING ELEMENTS — Globar Corp., Niagara Falls, N. Y., has issued a leaflet devoted to comparison of the cost of electric and gas heat in metallurgical work.

CONTROLLED ATMOSPHERE — Surface Combustion Corp., Toledo, O., is circulating a bulletin containing an article by R. J. Cowan, its metallurgical engineer, on heating and annealing in controlled atmospheres.

ELECTRICAL EQUIPMENT—Crocker-Wheeler Electric Mfg. Co., Ampere, N. J., has prepared a bulletin containing a resume of its line of motors, generators, motor generator sets and similar products.

WROUGHT IRON—A. M. Byers Co., Pittsburgh, has issued a bulletin on its wrought iron forging billets, covering the method of manufacture and physical characteristics and containing a table of billet classification and size extra list.

VALVES—Edward Valve & Mfg. Co., East Chicago, Ind., has issued a further section of its catalog No. 11, section C, covering cast steel valves, globe and angle stop, check and feed line stop-check designs. All standard series from 300 to 1500 pounds are completely described.

WOODEN TANKS—Hauser-Stander Tank Co., Cincinnati, has issued a new catalog, No. 33, of its various types of wooden tanks in plain, lead or rubber lined, many for use in metallugrical plants. The catalog is well illustrated and contains much information of value to users of tanks.

DIESEL ENGINES — Busch-Sulzer Bros. Diesel Engine Co., St. Louis, in a current illustrated bulletin presents its line of larger railroad diesels for heavy switchers and main-line passenger and freight service, in sizes from 1600 to 3500 horsepower. Data are presented in charts and tables and various diagrams and illustrations supplement the text.

PILLOW BLOCKS—Norma-Hoffman Bearings Corp., Stamford, Conn., has issued its bulletin No. 934-A on its line of ball and roller bearing pillow blocks. A complete line of two and four-bolt pillow blocks is presented, with bearings, and several series of take-up, machine and flange mountings, adapted for various machine assemblies. Shaft sizes range in the several types from 11/16-inch to 8-inch diameter. Load ratings and mounting instructions supplement the specification data.